The Chemical Age

VOL LXV 20 OCTOBER 1951 No 1684

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TECHNOLOGY DEPT.

"*Mind what you meddles with*—D. Barclay's grandson seeing something at Higgins' lectures which pleased, was induced to purchase a piece of Phosphorus, this carefully closed in paper he carried in his breeches pocket, till it suddenly inflamed and burnt his thigh so terribly that he has been in danger of losing life or limb but is now said to be in a fair way."

Robert Howard's caution to his son Luke, the young pharmacist's apprentice who later founded the firm of Howards, did not go unheeded. Luke Howard became a respected business man—a dependable and careful chemist. Today, over a century and a half later the firm of Howards is still recognised for particular care in the manufacture of technical chemicals.

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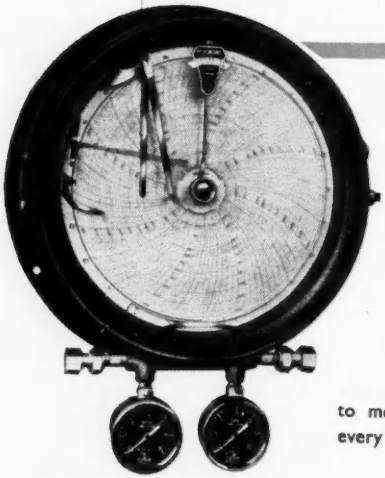

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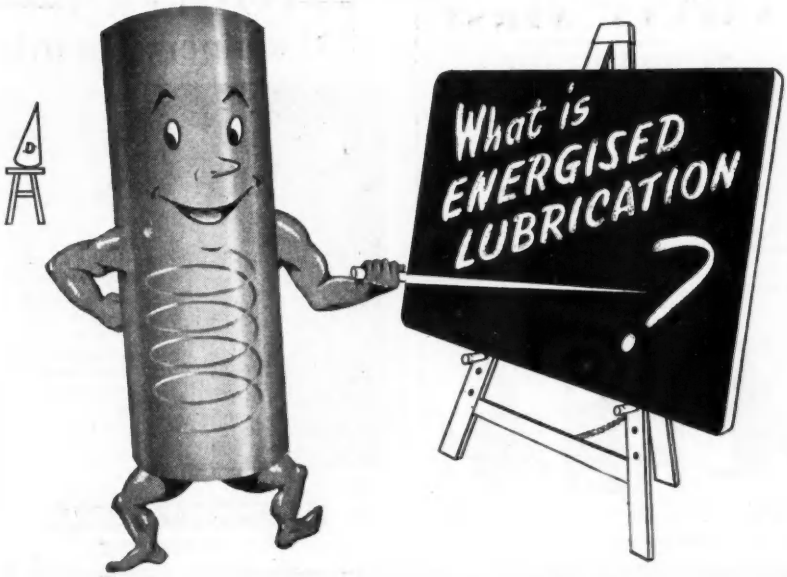

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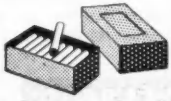
* AUDCO Hypermatic LUBRICATION



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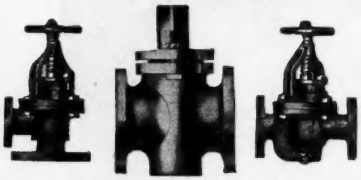

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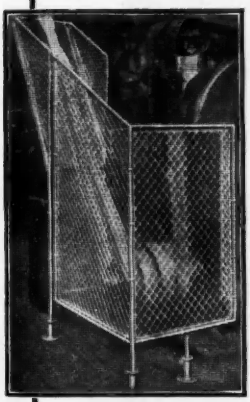

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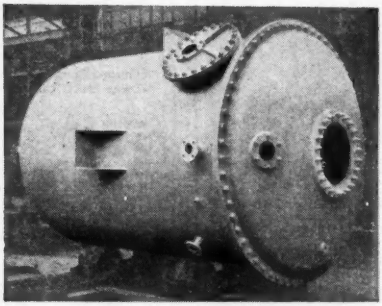

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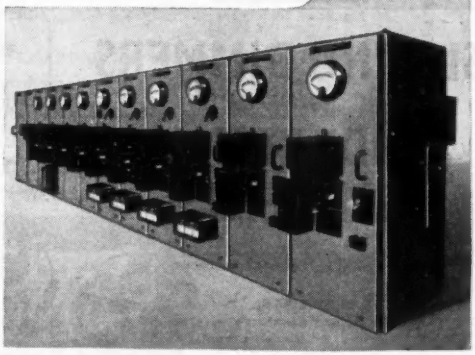
Right: Class AJ21 air-break switchboard supplied to the order of Messrs. Spearing & Co., Ltd., for the Iraq Petroleum Company.



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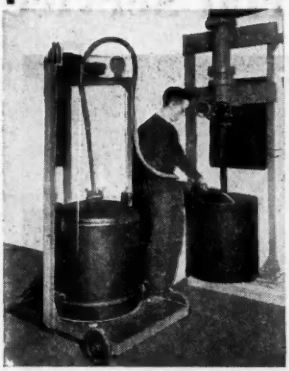

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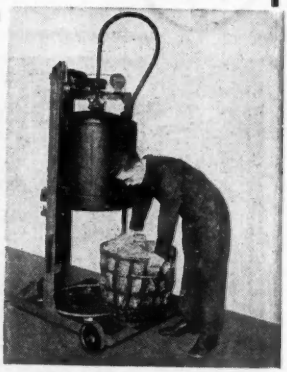

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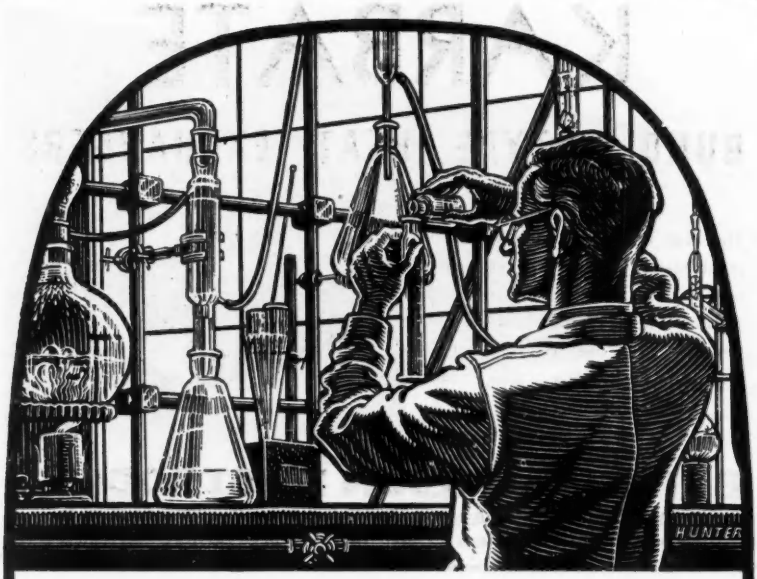

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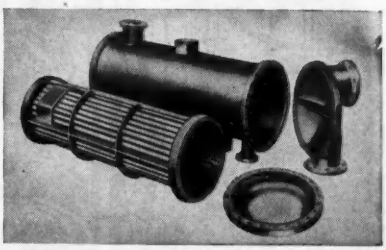

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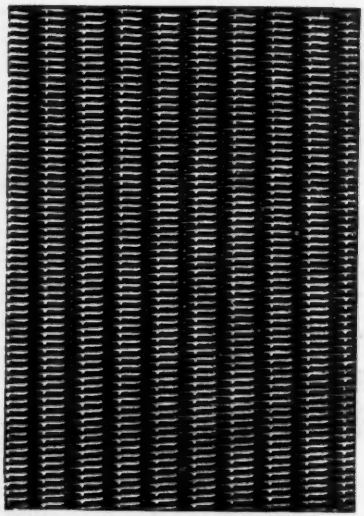

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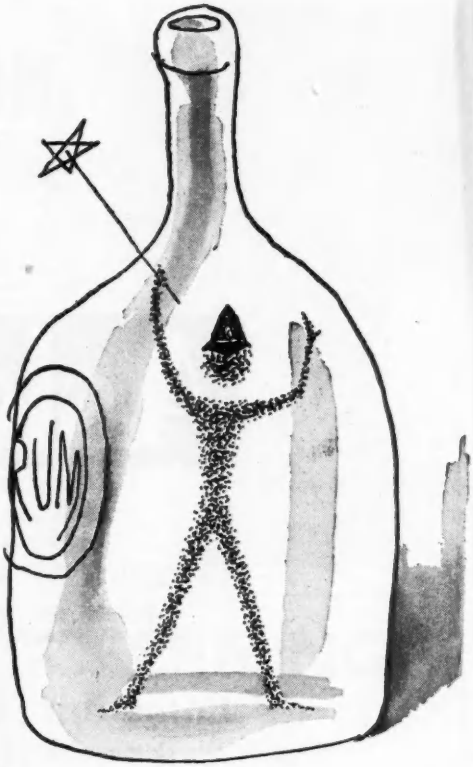

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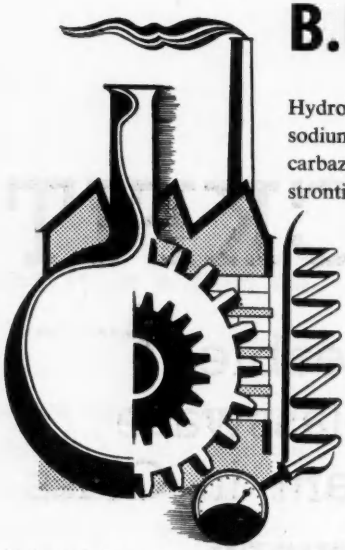

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Established 1919

The Weekly Journal of Chemical Engineering and Industrial Chemistry

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Volume LXV 20 October 1951 Number 1684

Business & Elections

by SIR ERNEST BENN

IT sounds exactly like a fairy tale, but it is nevertheless the fact that we used to say to one another, 'No politics in business'; the commercial traveller, when I was on the road, never dared to mention Gladstone or Salisbury until he was assured beyond a doubt of the political colour of his customer. The head of a well-known Birmingham firm turned me out of his office because, in an unguarded moment, I mentioned Lloyd-George.

Today, although business is saturated with politics, there remains the lasting incompatibility between the two, and the old rule firmly ingrained in the trade and technical journalist is still respected so far as to cause that aristocrat of journalism to refrain from any participation in the mud slinging of the hustings. Where definite interests are attacked it becomes necessary to discuss the practical issues involved, but such diseussion seldom goes the length of saying 'Vote for so-and-so.'

Although issues of the greatest gravity, from the business as well as other points of view, will be decided on 25 October, that decision will be made by the vast majority who cannot be called experts in political economy and who, for the most part, make no claim to much experience in business. The immediate task of the tradesman, or industrialist, is to assess to the best of his ability the prospects of the various parties and make such arrangements as he can to carry on, whatever happens.

The Election manifestos must be read as circulars asking for votes. The Prime Minister claims to be proud of his achievements, but there is enough evidence to show that he would not be sorry to hand over problems and difficulties to which no solution is offered by political means, and adopt, for a time, the easier rôle of critic.

The Tory prospectus is adequately, indeed courageously, gloomy; it emphasises our troubles and contains the minimum of those Utopian hopes and promises which for generations have been the stock-in-trade of the politicians and the planners. In particular the proposal to reintroduce the Excess Profit Duty must be regarded as a wise and justifiable sop to Cerberus, in view of the wide acceptance by the general public of the Ruskinian dictum that sin and profit are one and the same thing. The blame

for this destructive attitude of mind rests partly upon the Socialists, but the business classes themselves must accept responsibility for their failure to proclaim their faith in profit as the very life-blood of progress.

The profit question is altogether out of perspective, and the argument, if it may be so described, turns upon the doings of a score or more of mammoth concerns with their mammoth transactions. The young lady voter whose financial experience does not include the possession of a £5 note, is apt to take a fanciful view of 3 or 4 millions of profit in one account. There are, however, millions who live on such profits as they can make, and the utter dependence of the rest upon the success of these wielders of responsibility, large and small, is insufficiently appreciated. Profit and personal responsibility go together and the argument has found powerful reinforcement in recent attempts to conduct grandiose concerns without the element of personal loss or gain.

All experience has shown an Excess Profit Duty to be a very powerful lever to promote inflation; it encourages extravagance where economy is most needed and undermines the stability of those concerns to which it applies. There is, however, a compensatory reflection; in so far as the next government is able to check inflation and restore, or even only maintain, the value of the currency, excess profits are very likely to be conspicuous by their absence.

If the country should decide upon a change of government on 25 October, the immediate effect will be an alteration of mental attitude on the part of all those who retain the urge for a personal part in the well-being of the nation. To give a simple illustration it is more than twelve years since any industrialist could freely telephone an order for a few standards of timber, a few thousand bricks, ten tons of paper or a dozen barrels of oil. All this will not be altered in a moment, but the direction will be changed and that in itself is of supreme importance.

Twelve years and a month have passed since, without a moment's hesitation, the Nation accepted Socialism as part of the price of modern total war. When victory was achieved the electors decided to cling on to the inflationary delights of a planned economy. In approaching the coming election it is therefore wise to remember that for more than twelve years we have been bereft of the freedom to live in our natural normal way.

To think only of dividend limitation, rising prices, growing scarcity, the losses of nationalisation and many other current difficulties, when we go to the poll on Thursday, will be to take a very dangerous superficial view of a situation full of much deeper difficulties.

The abolition of markets, the destruction of the price mechanism, the levity which has replaced the sanctity of contract, the willingness to 'talk' with obvious wrong, and other such new ideas have badly damaged the foundations without which we cannot survive. On 25 October we shall know whether this nation has retained its traditional ability to face big issues in a big way.

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Notes & Comments

A Weed-Seed Killer

THERE have been more advances in chemical weed control in the past ten years than in the entire previous history of this branch of agricultural science. The selective hormone or growth-promoting types opened a vast new field in agricultural chemical substances. It would almost seem that farmers have been given enough to digest and develop for the next decade, but progress begets progress. While work in this country is already showing that some of the new weedkillers can be used as pre-emergent controls, a new weedkiller first discovered at the famous Boyce Thompson Institute for Plant Research in New York is claimed to possess the unique property of preventing effective germination. The substance is 2,4-dichlorophenoxyethyl sulphate. It does not have any toxic effects upon the foliage of established plants whether they are weeds or crops. Its single plant-killing property is that of destroying the freshly-germinated seedling, so powerfully inhibiting root and shoot growth that the stunted plants must die off rather than survive and grow. This, of course, is a new aspect of selectivity. So long as the crop plants are already established this new substance can be used to prevent the development of weeds before weeds actually appear. There are many such cases, e.g., strawberry fields, asparagus beds, sugar cane, perennial flowers, etc. Where a crop is itself raised from seed, the range of selectivity is obviously narrowed. Weed seeds in the soil cannot be controlled at the same time without damage to the crop seedlings though it is already suggested that seeds which are normally sown at some depth will be protected from the seed-toxic action.

The Ideal Substance?

ANOTHER remarkable property of this new substance is that it is toxic to seeds only when soil is present. Seeds treated with it *in vitro* germinate without damage or retardation. Soil and the living organisms in soil must be present, and it is assumed as a result that the actual seed-killing principle is some new derivative formed when 2,4-dichlorophenoxyethyl sulphate undergoes microbiological changes in the soil. The quantities needed per acre are small. No more than a few pounds are required. Application is made to the soil surface, the 2 to 6 pounds per acre (according to the type of soil) being dissolved in 40 or so gallons of water. During the cultivation of a crop such applications may be made several times at three-week intervals. In developing the growth-regulating weedkillers for horticultural crops much more severe problems of selectivity than those found in farm practice have been encountered—the margin between crop damage and effective weed control is all too small. If the claims made for this new substance are sound—and they are based upon extensive field testing—an ideal weedkiller for horticultural crops has been found.

Aid to Industry

THE comprehensive aid given to the chemical industry by the ABCM is indeed well shown in its 35th annual report published this week. Excellent work was done by the committees on Fine Chemicals, Tar Distillation Products and Dyestuffs. A special Raw Materials Shortages Committee was set up to investigate on a long-period basis of five years the production and consumption of products which appear likely to be in short supply. Although the British chemical industry has a good record for safety its importance cannot be too often emphasised, and Part II of the Model Safety Rules drawn up by the ABCM, now at the printers, will be welcome. A panel has also begun a detailed study of the problems of marking containers of hazardous chemicals so as to warn those handling them of the danger to which they may be exposed. An outline scheme has been prepared which, it is believed, will be approved by the Factory Inspectorate. It is to be hoped that this may prove an acceptable compromise between the safety and commercial considerations which at times appear to be in conflict.

Oil Studies Encouraging

Israel Orders Drilling Equipment

IMPORTANT oil prospecting studies are now being carried out in the northern Galilee area of Israel and in the sector between S'dom and Beersheba in the south of the country, by geologists of the Israel Research Council. Although no oil has yet been found, the results of the studies are said to be very encouraging and to warrant further research.

Since one metre of drilling costs about £100, the scientists consider it would be too expensive to start experimental drilling at this stage, although the recent acquisition by a water drilling company of two modern drills, capable of boring down to 2,500 metres, has brought a great improvement in the country's technical facilities for deep drilling. Additional new equipment has been ordered from the United States with funds from the Export-Import Bank loan which will enable studies to be made of deeper strata.

The studies now being conducted include geophysical studies of deeper levels. Two experimental bores were carried out by British scientists of the Iraq Petroleum Company in 1947, both in the southern area of the country, at Huleiqat and at Kurnub, but the work came to an end without any positive results due to the turbulence that ensued between Arabs and Jews. Since then, little has been done in the search for oil, although some research was carried out by scientists at the southern end of the Dead Sea, near the Palestine Potash works.

No Decision Reached

Lord Glenconner, chairman of the Palestine Potash Company, has now returned to Britain after conferring with Government of Israel officials on the resumption of work at the company's Dead Sea plant. It was learned that no decision was reached on renewing operations. The key question appears to be whether the Israel Government is prepared to lend the company additional funds over and above the $2,500,000 already granted to it by the Export-Import Bank loan. No final decision is expected until a new Israel government, now in process of formation, is in office. Lord Glenconner is expected to go on to America to confer with company officials there.

Further Amendment

Changes in Export Licensing Order

THE Board of Trade have issued a further amendment to the Export of Goods (Control) Order, 1951. The principal changes which become operative on 22 October, 1951, are as follows:—

(1) Licences are now required for all destinations for iridium, osmium, palladium, rhodium and ruthenium, their compounds, and alloys containing such metals, platinum compounds, paints containing zinc oxide (including leaded zinc oxide) and tyres and tubes of cross-section of 6 inches or more.

(2) Licences are now required for aluminium strip, certain types of air conditioning machines, specified oil well drilling apparatus and tools and oil well logging and exploration apparatus, plant of the kind used for automatic continuous electrolytic tinning of steel strip, certain types of turbines, balloons, and electrical machinery, leak detecting instruments, and strain gauging equipment and parts, for all destinations other than those specified in Part II of the Third Schedule excluding Hong Kong.

Inquiries regarding this amendment should be made to Export Licensing Branch, B.O.T.

IN THE EDITOR'S POST

'A Vicious Professor'

SIR,—In the Notes and Comments Section of THE CHEMICAL AGE dated 13 October 1951, you make a comment on Soviet scientific criticism. I am not in any way a supporter of Soviet Russia and I think I must be in agreement with your general attitude, but I think it regrettable that your comment is worded in the way it is. The Russians have, as you say, criticised Professor Pauling, but it is surely a distortion to impute to them the view that 'an electron in its orbit can be a world outlook hostile to anything.' In the next few lines you quote the Russians as speaking of the 'vicious American chemist Pauling.' The Russians said the theory was vicious, not the chemist.

In my opinion such a playing with words is to be deplored and I am sorry to see it in a technical journal.

Yours faithfully,

R. F. TWIST.

East Greenwich.

Record Export Achievements

ABCM Holds its 35th Annual Meeting

RECORD export achievements of the chemical industry and problems confronting it in the future were surveyed by Mr. C. G. Hayman, chairman, in his address to the 35th annual meeting of the Association of British Chemical Manufacturers held in London on Thursday, 11 October.

In his review of the year ended 30 June, 1951, after expressing regret at the tragic death of Sir Frederick Bain, Mr. Hayman said (in part):—

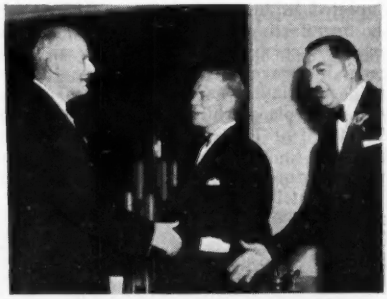
Shortly after the annual report was prepared, the President of the Board of Trade invited representatives of our Council and of our affiliated associations to meet him to discuss the subjects of exports. He drew our attention to the worsening position of our rearmament programme. This programme not only calls for increased imports of essential raw materials and manufacturing equipment, but also by monopolising a substantial part of our metal and engineering industries, it drastically curtails the exports in these fields which have made such an important contribution in the past. It was, therefore, essential that those industries which were less heavily involved in rearmament, and especially the consumer goods industries, should make a special effort to make good the loss of engineering exports.

The President reaffirmed the instructions given to our industry by his predecessor, that our first duty was to meet essential home needs, and congratulated us on our fine export record in spite of the steadily increasing demands of other industries for our products. In 1938, the value of the chemical group of exports was £22,000,000, in 1947, £67,000,000, in 1950, £107,000,000 and for the first half of this year, £66,000,000. Even allowing for the considerable changes in values over these last few years, this is an outstanding performance, and the second quarter of this year represents an increase in volume of nearly 100 per cent over the 1947 rate.

In spite of the growing shortages of essential raw materials, the President hoped that the present upward trend would be maintained. Tentative export targets may be suggested by the Board of Trade for some sections of the industry, but it is not intended that these should be made generally public. This might only cause misunderstanding since the first function of the industry is to meet essential home requirements.

In the annual report it is stated that exports to the U.S.A. in the chemical group in 1950 were valued at £5,860,000. It is gratifying to report that this figure was practically equalled in the first six months of this year. Exports to Canada also show a good upward trend, though not quite so spectacular. We are, therefore, playing a worthy part in the dollar drive.

The Pharmaceutical Productivity Team returned from the United States just before Christmas, 1950, but its report was not published until the first week in September last. It is an excellent report, and contains a number of recommendations designed to increase productivity in this country. These must be carefully studied and implemented, where appropriate, without delay, otherwise we shall not reap the benefit of the work of this team.



Before the dinner at Grosvenor House—C. G. Hayman, chairman ABCM, and J. Davidson Pratt, director and secretary welcoming a guest

As the study was concerned with the processing of pharmaceuticals to make them suitable for the retail market, and not with the manufacture of the products themselves, the task of implementation will be the primary responsibility of our affiliated organisation, the Association of British Pharmaceutical Industry. I am glad to report that this association is now actively dealing with the subject. The ABCM has offered its full

co-operation and support in this work.

What of the future? Some of the schemes of expansion set out in the Report to the President of the Board of Trade in 1949 have come to fruition. Others are still incomplete, and many have been delayed by difficulties beyond our control. Our problems will undoubtedly become greater as the rearmament programme gets under way, with its priority call on those metals and alloys, especially stainless steel, of which there is a serious world shortage, and on the engineering industries which make the plant and equipment we need. We have offered to assist the Government departments concerned in their task of devising ways and means which will not be too cumbersome in practice and will ensure as far as practicable that materials such as stainless steel are allocated to the purposes and uses for which they are absolutely vital.

Raw Materials Shortage

Many of the raw materials for our industry are also in short supply. Most difficult of all is, perhaps, sulphur, which we have imported in the past from the U.S.A. for the manufacture of sulphuric acid and other essential chemicals. The chairman and general manager of the National Sulphuric Acid Association have informed us of the long-term plans which in conjunction with the Board of Trade, it has put into motion in order to expand the use of other raw materials for sulphuric acid, such as pyrites (unfortunately, all imported) and anhydrite, of which there are abundant reserves in the United Kingdom. We are satisfied that everything possible is now being done to ameliorate the position.

It is also gratifying to learn that most users of acid are effecting every economy they can, and the recovery and re-utilisation of waste acid and acid residues is being intensively studied. In this, the ABCM is taking an active part. There have been reports recently of discoveries of new sulphur deposits, but this does not give any grounds for complacency on our part. The American chemical industry has had its own supplies of sulphur cut, and those people who are in a position to judge, consider that even the new sources will not do more than make good the existing deposits in the U.S.A. which are being exhausted, and, in addition meet the anticipated increased demand from the American chemical industry whose expansion in recent years has been phenomenal.

Our raw materials shortages committee has a heavy programme of work in hand. Prominent among the shortages are the raw materials from coal carbonisation, which are the basis of important parts of our synthetic organic chemical industry. Each problem is being studied on the basis of the ascertained future requirements of the user industries over the next five years, as compared with the forward production plans. This involves the collection and collation of a large mass of data, not only from members of this association, but from many other consuming industries often quite outside the normal chemical field. The data supplied by individual firms are highly confidential and must therefore be handled only by the staff of the ABCM. Only the bulked totals are made available to our Shortages Committee. I am gratified to be able to report that we have received excellent co-operation from all the firms who have been approached, and have met with no refusals.

Our affiliated association, the Association of British Pharmaceutical Industry, has also set up a shortages committee of its own. We have had a meeting with them to ensure co-ordination of effort and to avoid duplication. A meeting has also been arranged for next week with representatives of the Association of Tar Distillers, to discuss coal tar products. We sincerely hope that our efforts will enable us to foresee, and by appropriate action, avoid situations like that created by the sudden reduction in supplies of American sulphur.

Co-ordination Recommended

Last year, my predecessor, Sir Harry Jephcott, referred to the need for some simple machinery to try and co-ordinate the plans of the individual countries in Western Europe for the expansion of their chemical industries, in order to avoid the installation of capacity in excess of all likely needs. The Chemical Committee of the OEEC deals ostensibly with such problems, but our contacts with it are second-hand and spasmodic.

Representatives of most of the corresponding trade associations in Western Europe attend the meetings of this committee, in company with their Government officials, but this privilege is denied to us here, except on the rare occasions when the British

officials concerned feel that the subject is so technical that they need expert advice. It is proposed to raise this matter with the authorities in order to try to bring about a more vigorous and realistic consideration of these problems.

I am glad to say that the Ministry of Supply has called in representatives of our industry to help to deal with the problems likely to be created in the chemical field by the rearmament programme, and in the event of a worsening of the international situation. Some of the requirements, where small, may be met from current production, but we feel sure the Government will appreciate that in general, our production is all required to meet the normal needs of the industries we feed, and that to attempt to divert this production, or any substantial part of it, to rearmament would have a most serious effect on our industrial economy as a whole. Where rearmament needs are large, the creation of new capacity specially for this purpose will be essential.

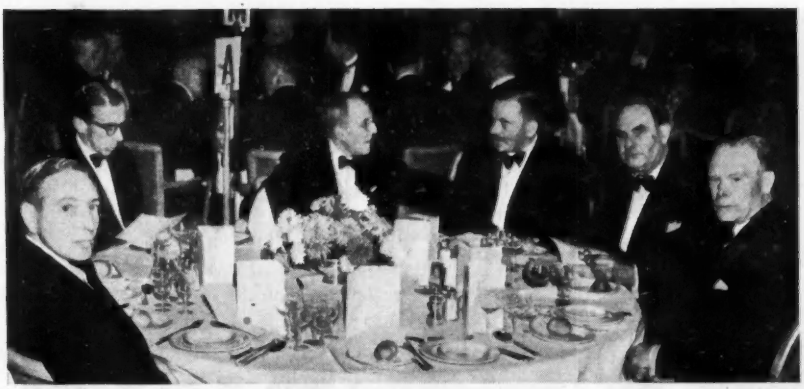
The Annual Dinner . . .

BREAKING down of reserve between one manufacturer and another and the exploring of much common ground to their mutual advantage and benefit of the industry as a whole, were emphasised by Mr. C. G. Hayman, the chairman, in his speech at the annual dinner of the Association of British Chemical Manufacturers held at Grosvenor House, London, on Wednesday, 10 October.

Mr. Hayman, in proposing the toast 'The Guests', said:—

The Association is greatly encouraged by the size of this gathering which, by a comfortable margin, is a record in its history. I cannot help feeling that the composition of this gathering is a true indication of the ever widening and growing influence of the chemical industry. Time does not permit and, indeed, this is not the occasion for a catalogue of statistics, but I think that it is right, nevertheless, to claim that in this national economy of ours so distorted by home and world conditions the chemical industry has achieved outstanding distinction in terms of volume, versatility and enterprise.

The British chemical industry, as far as the export trade is concerned, has, during the first six months of this year, contributed no less than a sum at the rate of £132 millions per annum. I appreciate that increasing prices make comparisons with previous years a bit dangerous, but to give you a fairly realistic close-up of the position, in the second quarter of this year exports were nearly 100 per cent up in volume over the 1947 rate. In considering those figures we



The top table—on the extreme right is the chairman, Mr. C. G. Hayman and on his right is Mr. Wm. L. Batt, chief of the E.C.A. mission to the U.K.

must remember that our primary function, as instructed by the Government, is the supply of home needs.

So far as the future is concerned, the outlook of course is bleak. We are threatened with shortages of certain raw materials and it will require all our ingenuity and courage to overcome those difficulties. It seems clear to me that we shall be driven to extracting more from a given unit. In other words it will mean a form of increased productivity. I have always hesitated to use that word because it is so widely used to-day that it has become hackneyed, and therein lies a danger because it is of fundamental significance to our existence.

On the question of increased production or, perhaps, to use a more accurate term, increased productivity, it seems to me that it may well be necessary for a broader approach to be made both by the Government and by industry to secure a truly common interest and a common purpose. There is no easy formula for that as you know, but I suggest that it does demand—not requires but demands—our close attention if we are really to get out on the broad highway and sustain the type of economy which we want to see in the years ahead.

There is also that Garden of Eden, shall I call it, the profit bogey. Forgive the analogy, but you know it is almost becoming a sin. That will have to be accepted as an essential part of any plan in the future. It is true, of course, that the profit motive will lack the glamour of the original historical episode, but I am sure you will agree that it is just as fundamental and even more lasting.

This is a truism which it is necessary to repeat and to keep on repeating in order, perhaps, to stimulate ourselves. In this age, so highly mechanised and scientific, the human element is still the main catalyst, and the reward for doing well is still the most natural target of human endeavour.

The main part of my remarks is to introduce to you our principal guest, Mr. William Batt. It is an honour to have the privilege and pleasure of his company this evening knowing how heavy are the calls upon his time.

Mr. Batt is the American Minister in charge of the Economic Co-operation Administration Mission to the United Kingdom. He is also a member of the North Atlantic Defence Production Board and in his spare time—if he has any—he is the president of the well-known American Company S.K.F. Industries. I have enumerated his various functions not by way of identification but by way of tribute, because we are conscious that Mr. Batt is doing a great job here in this country in helping us and, indeed, in helping Europe as well. It would seem appropriate to link with our acknowledgements to Mr. Batt our gratitude to the country of his birth, the United States of America. The strength of their help to this country is staggering enough measured in terms of hard cash, but its essence, its reality, resides in a superb act of brother-

Sir Harry Jephcott, immediate past chairman, presided at table F

Members of the Association entertained representatives from other chemical and allied associations, some of whom are shown here

hood based on true loyalty and interest in the common purpose and ideals of a free people.

In his reply Mr. Batt said:—

It seems a little unfair that I should be singled out from this whole host of guests and made to work for my dinner. I am confident there are so many of them who could have done the job so much better; but I want to thank you for the special and heartfelt words which your chairman had to say about my country.

My first contact with this industry came a few days after I arrived about a year ago when I was sent for by two or three of the Ministers of this Government and told in no uncertain terms how serious was the sulphur situation. However, the sulphur situation is not quite so bad as some people anticipated, although let me give you this warning. Do not believe all the stories you read in the newspapers about all the sulphur problems having been solved because we have found a little more in the U.S.A.

My Mission has been concerned with doing what it could to help the British people to achieve their own recovery. We do not take any credit for it; obviously we should not. We are glad that it has been possible for us here and there to do something of some little value for you.

One of the things in which we have been particularly interested is the Anglo-American Council for Productivity. These teams which have gone both ways telling each other their experiences will, I suspect in their significance, enormously outweigh any money which the United States may have contributed towards helping Britain to recover.

When I think of war production and rearmament I cannot fail to take my mind back to the early days of the war when the chemical industry played such a great part. For a time we were desperate for rubber, but a short time afterwards we had synthetic rubber produced in such quantities that we were never seriously embarrassed during the war, and ever since then the chemical industry, with the rubber industry, has been responsible for improvements in the production of synthetic rubber so that now we have a fairly good all-purpose synthetic rubber.

In 1943 we lost about 500,000 tons of shipping in one month and most of the ships were carrying bauxite. The position looked very serious until once more the chemists were put to work on the utilisation of what we call red mud or clay in which there is a considerable amount of alumina, and we soon had a substantial programme under way for the production of aluminium from that clay. Also the electrolytic deposition of tin through which I think we saved about two-thirds of the tin required for tinplate was very largely the job of chemists.

It is particularly in your field that questions of substitution and conservation lie, because substitution is the creation of new

things which can be used to take the place of something which is short. In the United States, we are seriously concerned about wool and I am advised that we are at work on programmes for the production of substitutes for it and materials which can be used with it.

Also on our side, and I expect on this side, we are looking to see what synthetics can be devised to take the place of copper, zinc and lead which are in short supply, particularly synthetics to replace materials which have to be used where there is acute corrosion. In this connection we are directing attention to special plastics in the hope of getting a solution to this problem. I am convinced that the shortage of raw materials to-day is not something which has been brought about because of the emergency and the re-armament campaign. Our stockpiling has played some part, of course, but I am convinced that the world is using up these materials faster than we can provide for. I believe that we have not looked closely enough at the implications of the political philosophy of more and more people working to capacity.

Management's Responsibility

We have been very interested in the two teams which went from here to the United States, one representing the fertiliser industry and the other pharmaceuticals. They are teams made up of representatives of labour as well as management, and, like most other teams which have come back, they say 'We could do more if we wanted'. Responsibility for implementing that suggestion, and the suggestion of all those other teams, lies largely, though not entirely, at the door of the managements of the companies represented. It seems to me important, not only for Britain but for the rest of the world, that her industry should be strong and competitive.

It is up to us in the United States and the whole of the free world to do what we can to see that a healthy Britain is maintained, because a strong Britain is an essential factor in arriving at a strong, free, democratic world society. We in the United States have looked to this country to provide a large measure of leadership on the Continent in that direction. We think that you are the motivating factor unmatched by any other nation and that to a substantial degree as you do, so will the rest of Europe.

New ABCM Officers

SEVEN new members joined the ABCM during the year, two being associates of existing members. Net membership at 30 June, 1951, was 217.

Elections at the annual general meeting resulted in the following constitution for the council for 1951/52:—

President: Mr. L. P. O'Brien.

Vice-Presidents: Dr. F. H. Carr, C.B.E., Sir Roger Duncalfe, Dr. E. V. Evans, O.B.E., Dr. P. C. C. Isherwood, O.B.E., Sir Harry Jephcott, Mr. C. F. Merriam, M.C.

Elected Members:—

Chairman: Mr. C. G. Hayman; *Vice-Chairman*: Mr. W. F. Lutyens; *Honorary Treasurer*: Mr. C. E. Carey; Mr. A. D. Daysh, Dr. A. E. Everest, Mr. I. V. L. Fergusson, Mr. G. E. Howard, Mr. L. G. Matthews, Mr. T. D. Morson, Mr. D. P. C. Neave, Mr. F. G. Pentecost, Mr. D. Spence, Mr. G. F. Williams, Mr. K. H. Wilson, O.B.E., Mr. W. J. Worboys, Mr. H. Yeoman.

Co-opted Members: Mr. B. A. Bull, Mr. E. M. Fraser, C.B.E., Mr. J. L. Harvey, M.B.E., Mr. B. Hickson.

Honorary Vice-Presidents: Mr. N. N. Holden, Lord McGowan.

Director and Secretary: Mr. J. Davidson Pratt, C.B.E., M.A., B.Sc., F.R.I.C., M.I.Chem.E.

Manager: Mr. A. J. Holden, B.Sc., F.R.I.C.

Oil Refining in India?

OIL refining on a large scale in India is contemplated by the Government of that country, it is reported, which has approached the Burmah-Shell Oil Storage and Distributing Co. of India and Standard Vacuum Oil and Caltex, both of the U.S.A., with a view to establishing either one or two plants there.

Alternative schemes are either one refinery of two million tons annual throughput capacity or two refineries each having an annual throughput of one million tons. In the case of the latter scheme one refinery would be sited in Bombay State and one in Madras.

The objects of the Indian Government are to save foreign currency by importing crude oil instead of the finished product and to promote the growth of an important industry.

New Graphic Panels & Control Desks*

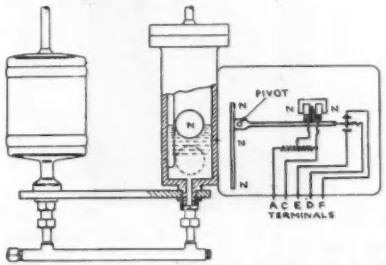
By LEO WALTER, A.M.I.Mech.E., M.S.I.T., M.I.S.A., Consulting Engineer

The Evershed 'Rollflow' meter is a transmitting type flow meter having range tubes for 20, 50, 100 or 200 in. water gauge and is used for measurement of liquid and steam flow. It comprises a stainless steel glandless manometer over one limb of which a transmitting type of meter is clamped, the measurements being transmitted over two wires to distant indicators, recorders or process controllers. Reading may be either on a linear scale with measurement directly proportional to the flow, or on a square law scale, in which case the measurement is proportional to the differential head. An orthodox mercury manometer designed to withstand a pressure of 1,500 p.s.i. is used. It is fabricated in stainless steel to avoid corrosion and thus permit the use of more highly volatile and corrosive liquids than would otherwise be possible with this type of meter. Gland leakage and spindle friction have been eliminated as no spindle emerges from the manometer. (Fig. 8.)

The transmitter incorporates a cylindrical floating magnet repelling a pivoted external strip magnet attached to an arm carrying a coil in a pot magnet. The current through the coil which is regulated electronically so as to balance the repulsion between the floating and external magnets, is thus a measure of the differential head, and hence of the flow. A micrometer adjustment is provided so that zeroing may be effected externally without adjustment of mercury level. A local indicator is incorporated in the transmitter case; it is magnetically operated by the floating magnet and is entirely independent of the transmitting mechanism and the power supply. The complete transmitter unit may be removed without any pressure joints being broken. Transmitted readings are independent of variations in electrical supply voltage or of the characteristics of the electronic valve.

A Recording Receiver for Graphic Panels

It is sometimes advisable to have miniature recorder-controllers inserted in the flow sheet of a graphic panel for obtaining a permanent record of the controlled variable. It was not easy for instrument designers to solve the problem of reducing the space required by an elaborate recording and controlling mechanism, but this problem has been solved, and promises considerable use in the near future.



(*Courtesy of Evershed & Vignoles, Ltd.*)

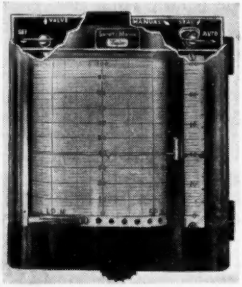
Fig. 8. Working principle of Evershed 'Rollflow' transmitter

A most interesting miniature type recording receiver with several special features has recently been developed, and is marketed under the trade name of 'Transet' by Short & Mason, Ltd., London. This is shown in Fig. 9. These instruments have been developed to 'fit' the advanced ideas in the 'Transet' pneumatic control system, which plays an important role on many different types of applications by recording and indicating all the essential process data, and eliminating the need for panel wings. From a centrally located control panel, the operator gets an immediate picture of the entire process. The units provide the needed processing data, remote setting of control points, automatic-to-manual service, and valve position indication.

The 'Transet' recorder is equally adaptable to conventional or console panels and its panel cut-out, $3\frac{7}{8}$ in. by $4\frac{1}{2}$ in., makes it possible to mount many of these instruments in a space required by only a few conventional recorders. A 30-day strip chart is provided, with three hours of visible record.

*Continued from Page 492, 13 October

The chart-drive assembly contains the chart-drive motor and the chart. This whole unit is easily removable by a camera-like action, so that charts can be changed quickly and simply. The relatively large space required by conventional circular chart recorders, and the space-saving qualities of the 'Transet' will be appreciated wherever a large number of recording instruments have to be assembled on a panel.



(*Courtesy Short & Mason, Ltd., London*)

Fig. 9. 'Transet' Recorder-controller for graphic panels

For those applications where records are not essential, 'Transet' indicators are available. This unit embodies the characteristic features of the 'Transet' recorder. A simple dual reading dial incorporates direct indication of both the set point and process variable. One scale is graduated to indicate the actual process range of the transmitter and the other, which is the outer scale, is graduated 3/15 p.s.i., so that valve position can be noted.

It is customary in the petroleum refining and chemical industry to centralise all instruments for an elaborate process in control rooms. They can be a partitioned off section of the manufacturing space, or separate buildings such as in oil cracking plants. Obviously the much smaller space occupied by graphic panels allows saving of cost and space for control rooms. The first installation cost for conventional panels and for the new graphic panels being about equal, the latter seem to offer financial savings in addition to their other possibilities.

It should be stated that American petroleum refineries seem to appreciate very much the many advantages of the new graphic control panels. Fig. 10 illustrates the outside view of the central graphic control station of Cosden Petroleum Corporation, shown by courtesy of Ian M. Kranose, control engineer, of Big Spring, Texas. This particular installation is for the control of a fluid catalytic cracking unit, was designed by Mr. David Boyd, and was the second of this kind to go into the economy and utility of this control method. An integral part of this installation is the console table with a Foxboro Dynalog control instrument, producing multi-point indication.

Foxboro d/p Cell and the Dynalog

Fig. 11 illustrates the now widely used Foxboro d/p cell unit for liquid level and rate-of-flow control as transmitting instrument for a Dynalog recording receiver-controller. The d/p cell converts differential

(*Courtesy Ian M. Kranose, Control Engineer, Cosden Petroleum Corporation, Texas*)

Fig. 10. Graphic Control room in oil refinery

pressure impulses from an orifice in a pipeline, or from a liquid-level measurement into proportional air pressure and transmits these impulses to a remotely located receiving instrument, for example, a Dynalog. The operation of a Foxboro d/p cell transmitter is as follows:—

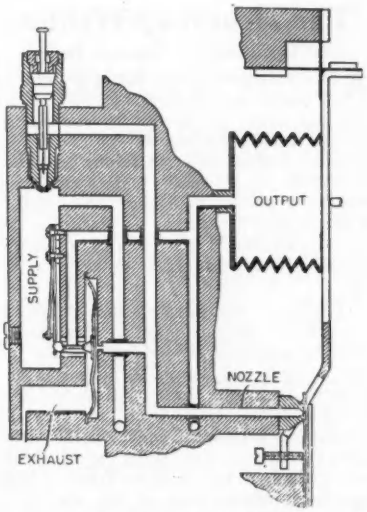
Pressures are applied to opposite sides of the diaphragm through the high and low pressure connections. The resulting differential pressure, multiplied by the effective area of the diaphragm, produces a force which is transmitted through the force bar to the range rod. The range rod imposes on the flexure-pivoted intermediate lever a force exactly proportional to the differential pressure on the diaphragm. The flexure tube supports the force bar and the range rod and acts as a line fluid seal.

Any tendency to movement of the intermediate lever is detected by the nozzle which, operating through the relay, alters the pressure in the feed back bellows to balance the force imposed by the range rod and maintain the intermediate lever in a fixed position. The pressure in the bellows is always exactly proportional to the force applied by the range rod, which in turn is exactly proportional to the differential pressure on the diaphragm. The pressure in the bellows, then, is an exact indication of measurement and can be transmitted to pneumatic receiving instruments.

Positive over-range protection is provided by the machined inner walls of the cell body which exactly match the convolutions of the diaphragm. Two vent valves are provided to permit removal of entrapped fluids. Easily removable glass cloth filters of fine porosity are provided at the high and low pressure connections to keep sediment out of the cell.

Electronic d/p Transmitter

An electronic type of d/p transmitter is also available which converts differential pressure into exactly proportional electrical resistance which is transmitted to a remote panel receiving instrument, such as a Foxboro dynalog. This electric transmission operates over great distances without time lags and offers immediately high, accurate response. Electronic d/p units can be successively switched into a single receiving recorder, or recorder-controller, thus producing multiple chart records. The mercuryless force-balanced mechanism has a built-in over-range protection.



(*Courtesy Foxboro-Yoxall, Ltd., London*)

Fig. 11. Foxboro d/p Cell Transmitter for Remote Control

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The Health of Welders

No Occupational Diseases Found

AN investigation into the possibility of ill health arising from the welding process has been carried out by the Factory Department of the Ministry of Labour and National Service and the results have been published in a book 'The Health of Welders', by A. T. Doig, M.D., D.P.H., H.M. Medical Inspector of Factories, and L. N. Duguid, B.Sc., A.M.I.(Mech.)E., M.I.W. (H.M. Stationery Office, 3s. post free).

The main conclusions are that welders do not suffer from any specific disease that could be described as 'welders' disease' nor does occupational dermatitis appear to be a frequent or serious cause of disability. Electric welders may suffer from 'arc eyes' but this has no permanent effect on the vision. Electric welders also suffer to a greater extent than other workers from a slight superficial inflammation of the eyelids.

Among welders exposed to high concentrations of fumes, slight irritation of the throat is not uncommon, but no serious effects on the throat or nose were observed. Symptoms, indicating a mild form of bronchial irritation were higher than would be expected in a comparable non-welding group. Exposure to welding fumes does not, however, predispose to pulmonary tuberculosis. Stomach troubles are no higher in welders than in the general population, rheumatism is not excessive, there is no evidence of ill effects on blood pressure or the nervous system and where there is good or moderately good ventilation there is little danger of gassing during welding.

The general recommendations include:—

1. No special precautions are needed where only occasional welding jobs are done, unless considerable quantities of very toxic elements are present.

2. Where oxy-acetylene welders are working there should be the same good general ventilation as for workrooms where fairly hot processes are carried out.

3. Close localised exhaust ventilation should be applied where articles are electrically welded on benches or stands.

4. In the welding of large articles of mild steel, such as vehicles or prefabricated parts of bridges, general ventilation should be relied upon if good practical methods of localised exhaust cannot be evolved.

Superphosphate Conference

ON the invitation of the International Superphosphate Manufacturers' Association's French members, a series of technical meetings of chemists and technical experts was held in France between 24 and 29 September, 1951. Some one hundred and fifty delegates from no less than twenty countries took part in these meetings.

While in Paris, seventeen papers on superphosphate, sulphuric acid and phosphoric acid manufacture, nitric acid processes, calcined phosphates, etc., were presented and discussed.

Delegates also visited at Rouen the works of the Société Potasse et Engrais Chimiques and part of the works of the Compagnie de St. Gobain. Following the meetings, delegates proceeded to Alsace, where the works of the Société des Produits Chimiques de Thann & Mulhouse at Thann, and the installations at the potash mines were visited.

Delegates were entertained at a banquet, cocktail parties and luncheons by French members and honorary members of the Association.

It is planned that the next series of technical meetings of the Association will take place in the United Kingdom in the autumn of 1953, by invitation of the United Kingdom superphosphate producers.

Divisions Centralised

THE completion of a fine new red brick building, adjacent to Manchester Oil Refinery, has made possible the gathering together under one roof of all divisions of Manchester Oil Refinery (Sales), Ltd. Hitherto, some of the sales divisions have been located at the refinery and others have had separate offices in Manchester.

Construction started on 1 January, 1951, and the first offices were occupied in mid-September. Site area is 3,500 sq. ft. Each room is centrally heated by an accelerated hot water system. There is a dining room, which also has facilities for film showings, and the entrance hall and waiting rooms have built-in displays illustrating the plant and the products and their uses.

The address is: Manchester Oil Refinery (Sales), Ltd., Twining Road, Trafford Park, Manchester 17. Telephone: Trafford Park 0218/9.

MIDLANDS ANALYTICAL METHODS DISCUSSION GROUP

Sulphur in Rubber

THE first meeting for the 1951-52 session of the Midlands Analytical Methods Discussion Group differed from its predecessors in that it was concerned in the main with the analytical chemistry of a substance within a single industry—and a not too widely known industry.

Explaining this, Mr. F. C. J. Poulton, of the Research Laboratories Dunlop Rubber Co., Birmingham, proceeded to outline the use of sulphur in the rubber industry and the significance of its distribution in the finished product, an outline which would give a very rough idea of the technology and terminology involved. Briefly, it was as follows:—

The fundamental rôle of sulphur in rubber technology is to produce a more elastic and less plastic structure in the raw polymer by the formation of a cross-linked system—a process commonly known as vulcanisation. Vulcanisation is aided catalytically by acceleration which involves the addition of certain organic compounds to the rubber. The mechanism of this catalysis is not yet fully understood, and in many cases the accelerator itself has to be catalysed or activated by the addition of some mildly reactive compounds such as zinc oxide and stearic acid.

The table below gives some indication of the distribution of sulphur in a typical rubber product:—

It should be emphasised that the table is not an analytical scheme. Thus, rubber-combined sulphur is not determined *via* a nitrobenzene extract. Indeed, the nitrobenzene treatment is essentially a degradation of the rubber matrix carried out at the boiling point of the nitrobenzene and is not strictly speaking an extraction. The acetone extraction is also carried out at the boiling point of the solvent on a 5 g. sample in a Soxhlet apparatus, the normal extraction time being 16 hours, although a 6-8 hour period often suffices. On the micro scale, extraction is complete in 2-3 hours.

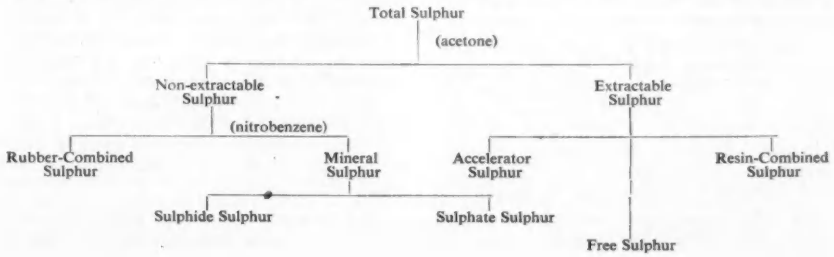
The table does, however, give an idea of sulphur distribution as seen through the eyes of the analytical chemist.

Before proceeding to an outline of the methods in use at the present time for the analysis of sulphur in rubber, it is important that some mention be made of the origin and the mode of occurrence of the above sulphur fractions within the rubber product.

When the rubber mixture is first prepared, sulphur enters the compound in not more than three ways. The first and most important source is the elemental sulphur in the ground crystalline form added for vulcanisation purposes. In soft rubber compounds this amounts to roughly 3 per cent of the whole and appears in the final vulcanised compound in two forms. The form of greater significance is the rubber-combined sulphur; in addition, there is a relatively small residue of uncombined or free sulphur.

Also to be considered are the two main forms of mineral sulphur. These arise mainly from various types of pigment, and although sometimes present in fairly large amounts, they play but a minor rôle in determining the final physical properties of the rubber compound, colour apart.

Thirdly, there is accelerator sulphur, so-



called because it is the small amount of sulphur introduced as organic accelerators which are generally compounds of the mercaptobenzthiazole, dithiocarbamate, or xanthate type and often contain sulphur in the molecule. A minor complication is introduced by the formation of sulphur resin compounds, which are formed as a result of the reaction between certain resinous components of the raw rubber and a very small proportion of the elemental sulphur added for the main vulcanisation reaction.

Two-fold Object

The appearance of sulphur in so many guises in the table is mainly due to the vulcanisation reaction which rarely proceeds to completion, together with a number of side reactions. The object of the analysis, therefore, is two-fold. Firstly, to give an indication of the original sulphur constituents and their amounts, and secondly to throw some light on the physical properties which may be expected (this from a study of its final composition), or even on processing conditions which the sample may have undergone and which arise from a certain determinable degree of vulcanisation.

With regard to the analytical methods in common use for the determination of sulphur in its various forms, first in order of general importance is the determination of those fractions which indicate the state or degree of vulcanisation of the rubber compound. Hence, procedures for the determination of total sulphur, free sulphur and rubber-combined sulphur may be surveyed in turn. It may be mentioned at this stage that the methods for the determination of the fractions of mineral sulphur are essentially the same as those for non-mineral sulphur, so that a detailed account of the main methods may be given, followed by a mention of any modifications necessary for the determination of the mineral sulphur.

The determination of total sulphur and rubber-combined sulphur can be discussed together, as the only difference between them, from an analytical viewpoint, is the prior extraction of the latter with acetone, although, of course, the difference in interpretation is a fundamental one. There are two methods in general use at present:—

(i) The fusion or wet method, and
(ii) The combustion method.

In the first, about 0.5 g. of the sample is carefully treated with nitric acid saturated with bromine, and the reaction allowed to proceed for at least one hour. The reaction mixture is then taken to dryness on the water-bath, the dry mixture moistened slightly, mixed intimately with anhydrous sodium carbonate, and ignited in a nickel crucible. Heating is carried out over a sulphur-free flame such as from a petrol burner, or by means of an electric muffle furnace. After cooling, the contents of the crucible are extracted with hot water, filtered, and evaporated to dryness in the presence of a small excess of hydrochloric acid. The residue is moistened with hydrochloric acid, dissolved in water and the solution boiled, with subsequent filtration if necessary. To the boiling filtrate is added hot barium chloride solution. The chemistry of the process is simple: the less oxidised forms of sulphur are immediately converted to sulphate by the strong oxidising acid, and the insoluble sulphates of barium and possibly calcium are broken down by the fusion to give by metathesis soluble sodium sulphate.

Sulphate Ion Determination

The method then resolves itself into the eventual determination of the sulphate ion. The classical gravimetric barium sulphate procedure furnishes excellent results, no co-precipitation occurring, probably because only small amounts of foreign salts are present. It is a time-consuming process, however (although the digestion itself takes up most time) and it may be that a titrimetric finish would be useful in this respect. Titration of the sulphate with standard barium chloride using sodium rhodizonate as indicator has been tried, but has not proved very satisfactory. The procedure of Miller (1940) who determined sulphur in pyrites, offers several advantages and may be applied. Here, the indicator is stable. A measured excess of a standard barium chloride solution is added to the sulphate solution, and the excess back-titrated in presence of alcohol with a standard solution of ammonium sulphate. It has been found by some workers that external spotting with very dilute hydrochloric acid improves the end-points considerably.

The combustion method has come into use mainly during and since the war and is

based essentially on the empty tube technique developed by Belcher and Spooner (1943). Briefly the method is as follows:—Oxygen is metered through a purifying train into a silica combustion tube heated by an electric furnace. The products of combustion, which, of course, include the SO_2 from the burning sample, are collected in a bell-shaped silica tube and passed through a scavenging train into neutral hydrogen peroxide. The sulphur is finally converted to sulphuric acid which is titrated with standard alkali.

Some of the more interesting features of the combustion train may be described. A very rapid oxygen flow (500 ml./min.) is used, and this encounters considerable resistance from the train, thus creating a substantial back pressure. To overcome this, suction is applied at the other end of the apparatus equivalent to a gas flow of 550 ml. per minute. Thus the apparatus operates under slightly reduced pressure. A small air-leak tube piercing the exit bung of the combustion tube serves to maintain a slow fusion pressure behind the bell-shaped silica tube and this prevents the products of combustion diffusing into the dead space at the end of the tube.

A smaller sample (*c.a.* 100 g.) is required for the combustion procedure, especially if samples are to be taken at intervals. The sample is cut into small pieces, which are laid separately in the bottom of the boat and covered with silica, without which the burning of the sample is completely uncontrolled, quite erratic results being obtained.

Furnace Temperature

With regard to furnace temperature, a large number of rubber compounds include calcium or barium; in such cases it is necessary to heat the furnace to a temperature of at least 1,350°C. in order to decompose the alkaline earth sulphate which would otherwise be formed. When these metals are absent, all the sulphur in the samples can be recovered at an operating temperature of 900-1,000°C.

There is no doubt that the combustion process is more popular than the older fusion method. Its outstanding advantage is its rapidity, a determination being completed in much less than one hour, against more than one working day for the wet procedure. On the other hand, it requires fairly costly apparatus which should for preference be kept in permanent assembly; this makes considerable demands on the bench space of a small laboratory. The accuracy of both methods is about the same, although some workers believe that the wet method may be more accurate in the hands of a skilled analyst. With less skilled staff, the combustion method is virtually foolproof once manipulation technique has been mastered.

Combustion Difficulties

One of the main snags of the combustion method occurs when other acid-forming elements (Cl, N) are present in the rubber. Here straight alkali-metric titration of the combustion products is not possible. However, there seems to be no reason why the well-known mercuric oxycyanide titrimetric procedure should not be applied. When chlorine alone is present, the total acidity could be determined and then the chloride determined on the same solution, the determination taking less than five minutes. Nitrogen occurs in many synthetic rubbers, *e.g.*, in polyacrylonitriles. Sulphur may be determined in presence of both chlorine and nitrogen by a modification of the mercuric oxycyanide procedure. Excess of a standard barium chloride solution is added, then mercuric oxycyanide, and the alkali liberated is titrated with standard sulphuric acid, or better, with perchloric or nitric acids which prevent a cloudy end-point. A good reproducibility is obtained with pure-grade mercuric oxycyanide, and in general the end-point is better than that given by barium rhodizonate. Many modifications have been made to the benzidine precipitation procedure whereby titrimetric, colorimetric and manometric finishes have been employed in addition to the gravimetric method, but all have the disadvantage that the original precipitate is soluble to some extent. The method is not recommended when results of the highest accuracy are required. When chloride is present, incomplete precipitation of the benzidine sulphate occurs, due in part to the prevention of proper crystal formation and subsequent growth. Some workers have applied an amperometric finish to the combustion, but have obtained low results.

For the determination of free sulphur, or, more correctly, extractable sulphur, the choice of method depends on which part of the extractable fraction is being considered. If, as is sometimes necessary, it is required to determine the gross amount of extractable sulphur, then a non-selective

oxidation method can be used. The whole of the acetone extract is then treated with concentrated, or even fuming, nitric acid in the presence of potassium chlorate as a supplementary oxidising agent. More than four hours may be necessary for complete oxidation, and, as the oxidation of sulphur in the massive form is rather slow, the amount of sample should be reduced if an excessively high free sulphur figure is anticipated. The oxidised solution is then carefully evaporated to dryness in the presence of hydrochloric acid, the residue dissolved in a few drops of hydrochloric acid, the solution diluted and the sulphate precipitated with hot barium chloride. This method is still widely used, despite its obvious disadvantages, because it makes very little demand on apparatus and is suitable for series analysis.

Copper Spiral Method

More often the gross amount of extractable sulphur is of secondary importance and the figure of greatest significance is that for elemental sulphur, as this latter indicates more closely the proportion of the added sulphur which has not entered into the main vulcanisation reaction. Probably the most common method in use is that described by the B.S.I. and known as the copper spiral method. This also involves a preliminary separation with acetone, and after or during extraction a chemically clean copper spiral is introduced into the solution, and this reacts with the free sulphur to give copper sulphide. Sulphur-containing compounds, either accelerators or resins, are not generally attacked by copper. The copper is then washed and transferred to a reaction flask where it is treated with hydrochloric acid. The H_2S thus liberated is passed into cadmium acetate, which is then acidified in the presence of excess iodine. An ordinary titration with thiosulphate completes the determination.

Recent work in the Dunlop Research Laboratories is noteworthy. Information was required on which accelerators tended to split off free sulphur and give fictitiously high results. The published procedure gave incomplete recovery of sulphur, but a few modifications to the original apparatus gave recoveries of the order of 99 per cent, with a high precision. Rubber bungs were replaced by ground glass and the area of the glass surfaces was considerably reduced, this modification serving to prevent undue adsorption of H_2S.

Two further methods for the determination of extractable sulphur are of interest, as both aim at giving the so-called 'true' free sulphur value. The first, of Russian origin, has been adopted as standard by the A.S.T.M. It is unique in that no preliminary extraction is necessary, thus giving an immediate saving in time of about 16 hours. The rubber, well milled, is boiled with aqueous sodium sulphite in the presence of a wetting agent to give penetration, and paraffin wax to prevent frothing. The free sulphur combines with the sulphite to form thiosulphate, and, after the removal of interfering ions (sulphide, carbonate), the thiosulphate is titrated iodimetrically. The excess sulphite is removed with formaldehyde. The method is extremely rapid and easy to work, although not quite so accurate and not so selective as the copper spiral procedure. In the presence of certain common accelerators, for example, it tends to give high results, but for control work it is most attractive.

The most selective and most accurate method for the determination of free sulphur is that originated by Proske. The rubber sample is extracted with acetone and the actual determination is carried out on a dry acetone extract. The acetone extract is dissolved in 5 ml. of distilled pyridine, the solution cooled, and 10 ml. of absolute methanol added followed by 5 ml. of a sodium acetate-acetic acid buffer. The solution is polarographed after the removal of oxygen in the usual manner between the range -0.3 to 1.0 v. In this electrolyte the sulphur has a half-wave potential of -0.063 volts measured against S.C.E. Where serious studies of the vulcanisation reaction are contemplated, the polarographic method is by far the most attractive.

Differing Methods

Methods for the determination of mineral sulphur differ from those for free and organically combined sulphur only with respect to the preliminary treatment of the sample. Acetone extraction removes the so-called extractable sulphur, leaving rubber-combined sulphur and total mineral sulphur. Treatment at a high temperature with a high-boiling solvent, *e.g.*, nitrobenzene, *p*-dichlorobenzene, dissolves the vulcanised rubber, leaving only the added powders—inorganic fillers, carbon black, and pigments—which are separated by centrifugation or

[*continued on page 530*

American Newsletter

(From Our Own Correspondent)

THE Bakelite Company of New York has developed a new method of plating metal on bakelite and vinylite plastics. Important economies are effected because items moulded of the plastics cost less to ship than solid metal, are more resilient, lighter to carry and are highly resistant to heat, abrasion, and weathering, as well as having a hard, highly polished metal surface. New applications for these articles are likely to be in aeroplanes, trains, cars, luggage and handbag accessories, etc., in place of solid metal.

* * *

MAGNESIUM alloys can be formed by a metallic powder compressing process rather than by the conventional process of molten alloying, according to a report prepared by the Dow Chemical Company of Michigan for the United States Air Force. The new process consists of mixing very fine magnesium powder with powdered alloying metals, and extruding the mixture. In the present process the molten alloy is cast to form ingots or billets which are then extruded. The powder-extrusion process, it is claimed, results in higher strength and makes possible new alloy compositions not obtainable by the melting and casting process. These new compositions are said to be stronger, more resistant to corrosion and more easily fabricated.

* * *

A NEW fluorescence analysis unit for the rapid qualitative and quantitative analysis of metals, alloys, minerals, ores, chemical mixtures and compounds, has recently been announced by the North American Philips Company, Inc., New York. Specimens under analysis are exposed to an intense beam of X-radiation. The resultant individual X-radiations, representing the various constituents, are passed through a collimating system to a crystal which serves as an analyser and which, by proper positioning, reflects each of the individual radiations at a specific angle. Intensities are measured by means of a Geiger counter, arranged with the crystal on a specially designed goniometer. Data obtained from this system may be evaluated in terms of percentages of the elements present. The output of the special volume-sensitive Geiger counter drives a strip chart recorder or a count register. The chart instrument is used for normal analysis and the register for when great quantitative precision is required. This method of analysis is entirely non-destructive and permits analysis of very small amounts. Difficult analyses involving solids, semi-solids and liquids can also be carried out in much less time than with ordinary chemical methods.

* * *

THREE metals, offering outstanding resistance to extremely high temperature and corrosion, are coming into commercial production for the first time as a result of scientific research on jet and rocket motors, gas turbines, and nuclear energy engines, according to two reports presented recently at a meeting of the New York Section of the American Chemical Society. Titanium, zirconium, and molybdenum are fulfilling performance requirements unheard of ten or twenty years ago and have 'their foot in the door' of industrial acceptance and use, according to two chemists of the Battelle Memorial Institute, Ohio. Two other unusual metals, chromium and vanadium, are 'just outside the door', with further research and development needed before they are ready for large-scale commercial production, they added.

Titanium is the farthest along toward becoming a tonnage industry, said Dr. Campbell, one of the chemists. With its light weight (intermediate between aluminium and steel), high strength (particularly in the alloyed form), and excellent corrosion-resistance, especially against sea water, it is finding many uses as a structural material, although it will not withstand certain acids. Zirconium, on the other hand, shows remarkable resistance to the acids which corrode titanium, and also excellent resistance to caustic. (Zirconium is heavier than titanium, but lighter than steel). Newly-developed special coatings for protecting molybdenum from oxidation at high temperatures, advances in the methods of welding this metal, and its availability in large sizes and shapes, is allowing engineers for the first time to take advantage of its extremely high melting point and excellent strength at elevated temperatures. Chromium, previously known as a plating metal,

now shows promise of being useful as a structural metal in its own right. Its main use will be at high temperatures in air, when its strength and oxidation-resistance are outstanding. If methods can be devised for handling it and making it into structural shapes, its usefulness will be vastly increased. The 'weak sister' among these metals is vanadium. Tests on the high-purity metal made by recent improved processes have shown that, contrary to former beliefs, vanadium is a highly ductile metal, subject to easy moulding and shaping. Little is known about its properties in this state, but, so far no really outstanding properties have been discovered. Future experiments may, however, turn up some desirable property in the metal.

* * *

THE U.S. National Bureau of Standards has recently announced publication of a new handbook (No. 45), entitled 'Testing of Measuring Equipment', which deals with commercial measures and measuring devices. Intended for use by weights and measures officials, the 205-page, illustrated book should also prove of interest to commercial and industrial testing organisations. Descriptions of commercial measures and measuring devices are included, also recommendations for the apparatus needed for their official examination, instructions for their inspection and testing, step-by-step testing outlines supplementing the discussions on testing procedures, and some general comments about inspection and testing which are applicable to all classes of commercial devices. Recommending the minimum testing requirements for the exercise of routine control, this handbook is based on the codes of specifications, tolerances, and regulations for commercial devices adopted by the National Conference on Weights and Measures and suggested by the National Bureau of Standards for promulgation by the states.

New Canadian Chemical Plant

CONSTRUCTION of the $50,000,000 plant of the Canadian Chemical Co., Ltd., on a 430-acre site east of Edmonton is now well under way. Preparation of the site started in July, roads have been built, major items of equipment ordered and erection of plant buildings has begun.

Various industrial organic chemicals will be produced from the oxidation of hydrocarbons process developed over a period of years by the Celanese Corporation of America, of which the company is a subsidiary.

In addition to the chemical installation the Edmonton plant will include units for the production of cellulose acetate, staple fibre and filament yarn.

Output of the petro-chemical unit of the new company, according to a statement by its president, Mr. Harold Blancke, will include more than sufficient quantities of formaldehyde and pentaerythritol to meet domestic requirements, leaving some available for export.

Other chemicals to be produced include propylene, glycol, methanol, acetaldehyde, mixed butanols and isobutanol.

The plant is scheduled to be in operation within 18 months and will eventually employ 700 people. Some 75,000 gallons of petroleum gases from the Alberta oil fields will be consumed daily, while natural gas from the same source will be used as fuel in the power plant.

Part of the project is intended to develop Canada as a major supplier of cellulose acetate of which production of 25,000,000 annually is estimated.

Sulphur in Rubber

continued from page 528

filtration and fused with sodium carbonate in a nickel crucible. The sulphur is precipitated as barium sulphate.

Sulphide sulphur determination is similar. The mineral matter is separated from the organic matrix by solvent treatment and the dry powders weighed into the reaction flask of a gas evolution apparatus of the type used for the determination of free sulphur, and the same process carried out.

Bomb methods have not been widely applied to the determination of sulphur in rubbers though on paper they would seem to offer advantages. Thus, if the rubber could be obtained in a sufficiently finely divided state, and, if the rubber behaved as a normal organic compound, then micro bomb methods, accurate, and suitable for batch analysis, would seem to hold distinct advantages over other methods. The presence of nitrogen and chlorine would cause no trouble and many more bomb than combustion determinations could be effected in a single day.

The Hot Spraying of Lacquer

Hercules Powder Company Hold Conference

NITROCELLULOSE lacquers are said to be creating new interest as finishes for automobiles, furniture, etc., as a result of new hot-spraying techniques, and on the evening of 9 October the Hercules Powder Co., Ltd., held a conference at the Waldorf Hotel, London, at which a representative from their Wilmington (U.S.A.) office, Mr. Rufus F. Wint, spoke on recent developments. Following his address a discussion period was held at which it was revealed that British manufacturers have not lagged behind the Americans in the development of this process and in some instances are ahead of their friends across the Atlantic. For instance, one British firm at least has been regularly supplying a hot-spray lacquer containing 43 per cent solids, whereas 40 per cent solids seems to be the maximum obtainable in the U.S.A. and 30 per cent usual.

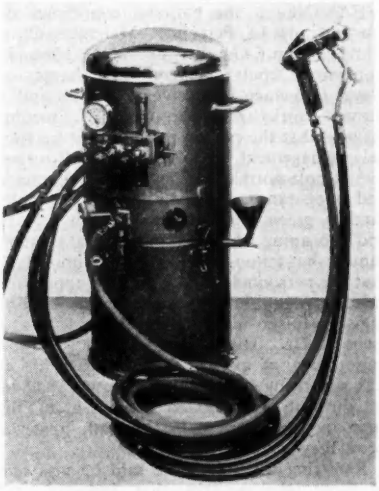
Big Time Saving

When 'low-viscosity' nitrocellulose was introduced to the American coating industry in 1922, it made possible the finishing of automobiles and other products with a drying schedule of minutes in place of days. The lacquer dried quickly and entirely by evaporation of the solvents, but several coats were needed. The number of coats could not be reduced, for if the solids content were increased beyond 20 per cent, the lacquer became too viscous for practical spraying. Partly for this reason, a large section of the automobile industry turned to other types of coatings in the 1930's.

Resin coatings of various types were widely adopted by the automobile industry since they contained about 40 per cent solids. These resins had to be baked or dried by infra-red heating units, or in ovens, but the cost of the baking equipment was offset by the saving in the number of coats required, and by eliminating the labour of rubbing the surface to a high polish. Between 1930 and 1940 many industries adopted the resinous finishes, particularly those of the 'alkyd' type. While the overall use of nitrocellulose lacquers continued to increase (they are now used on 75 per cent of wood furniture and half the new cars), the resinous finishes gained a market about three times as large as the lacquers.

If a lacquer is heated, its viscosity is reduced and a solution with a high percentage of solids can be sprayed, giving a thicker coat. While this principle appears elementary, only recently has practical heating equipment been developed, and only in the past year has it come into general use. Hot-spray lacquers now account for only 8 per cent of the total volume used in the U.S.A., but growing interest and new installations of heaters point to an increase in this proportion. Automobile manufacturers are testing the process, and specifications for use in finishing parts of military aircraft are now being prepared. Another promising field appears to be the refinishing of used cars, where less labour in preparing the surface, elimination of special drying facilities, reduction in number of coats, and quick drying are advantages.

In the heaters available, various heating methods are employed and about eight companies have developed units with design advantages for various applications. Many of the units include a small tank, a circulating pump, and a heat source, which may be steam or electricity. One units serves



One of the types of hot-spray equipment

D

one spraying location. These heating units are designed for use with most conventional spray guns.

The formulation of the lacquers for hot-spray methods requires changes in solids content and in the types of solvents. The price per gallon is perhaps 20 per cent higher, since the solid ingredients are more expensive than the solvents, but this is offset by the greater thickness of the coating, which is increased some 40-55 per cent. Less solvent to evaporate brings about an additional saving. When a typical 30 per cent solids hot lacquer is used, 2.33 lb. of volatile solvent are required to apply a lb. of solids, but a 20 per cent solid normal lacquer would use 3.76 lb. of solvent.

Many heaters developed for hot spraying of lacquer are being used to advantage with all types of finishes, including paints and synthetic resinous coatings. The same advantages of better covering and reduced viscosity with less waste of thinner obtain with these materials, although the problem of applying more solids per coat is not so great here as with lacquers. Since total sales of paints, varnishes and lacquers are well over a $1,000,000,000 annually (lacquer sales alone are some $150,000,000) the field is a promising one.

Long-Haired Types Taboo

SPEAKING at the national conference of the Institute of Personnel Management at Harrogate on 6 October, Dr. W. G. Hiscock, war-time Deputy General in Charge of Royal Ordnance Explosives Factories and a former works manager of I.C.I. recommended that the person recruited for personnel management should, above all other things, be a normal human being in character and appearance. Such things as long hair, sandals, green shirts and pink ties on a man, and the aping of masculinity by a woman, should be taboo. It was most important that the personnel team should be approachable, have an honesty of purpose, be unselfish in disposition and happy in temperament. Dr. Hiscock also stressed the importance of personal cleanliness, for it was surprising how workpeople who had to get dirty at work looked askance at untidiness and slovenliness in the staff, however good they were at their jobs.

Referring to politics, he said he was one of those who thought that industry and politics did not mix, and he recommended that politics should be kept out of the office and works. It was surprising how much discord and even hate could be created over politics. He also expressed the opinion that people with extreme views did not make the best managers, particularly in personnel work. Extremists were often cranks, he asserted, and ordinary workpeople did not like cranks.

Non-Ferrous Metal Control

Governments Accept Proposals

ACCEPTANCE by the Governments of the countries on the Manganese-Nickel-Cobalt Committee of its plans for the distribution of nickel and cobalt for the fourth quarter of 1951 was announced on 11 October.

After the U.S.A., highest allocations (in metric tons) were distributed as follows: Nickel: U.K. 5,088; France 1,461; Germany 1,425; Canada 750; Sweden 736; Japan 485. Cobalt: U.K. 329.1; Germany 127.5; France 75; Japan 60.4; Sweden 42.2.

In both cases the total available production of primary metal, oxides and salts of all participating countries has been taken into account for distribution: individual allocations represent entitlements for consumption in the fourth quarter out of domestic production or imports. At the same time the committee has calculated the net amount that each country shall purchase for import or sell for export during the quarter.

Demand by producer countries for a long-term price guarantee is proving the chief stumbling block to efforts of the International Materials Conference to finding a workable scheme for fixing the price of tungsten. The proposals under discussion call for a price agreement over several years, but would provide for a quarterly review of allocations.

Producers are concerned because they foresee the possibility of being faced in the future with increased production facilities when the demand has decreased. Talks on the international control of tin failed earlier this year, because of a similar problem.

Lead is another difficulty to be overcome. Although some months ago when the supply position was discussed it was considered allocation was not necessary, the U.S.A. has now asked that it should be reconsidered, and has requested a distribution programme for the first quarter of 1952.

The Chemist's Bookshelf

SURFACE ACTIVITY. J. L. Moilliet and B. Collie. E. and F. N. Spon, Ltd. London. 1951. Pp. 379. 55s.

The entirely laudable object of this book is to present the confused mass of published material dealing with surface active agents in a logical and coherent form. The method used is to relate the industrial processes discussed to the underlying physical chemistry and both to the chemical constitution of the chemical substances involved. The authors have not been assisted in their task by the depressing fact that our knowledge of the chemical constitution and mode of action of many of the commercially-used surface-active agents is far from complete. Nevertheless they have succeeded in imposing some sort of order upon the welter of information.

A book of this type can never be better than the sources of its information unless a critical note is introduced, and it seemed regrettable that this attitude was not maintained by the authors. The bulk of the information discussed has appeared either in patent specifications or in reports of the Allied Missions which were sent into Germany after the war. Details revealed in patent specifications are never completely free from suspicion and particularly in the field of surface active agents there has been a tendency to base claims upon the most superficial investigations. In addition a proportion of the material collected from Germany was based upon hearsay and extrapolation.

The book is divided into three sections, the first section dealing with the physical chemistry of interfacial phenomena. This section is particularly clear and complete and serves as an excellent introduction to the subject.

The second section contains descriptions of a number of technical and commercial applications of surface active agents. It is not a comprehensive survey and should be considered as a guide rather than an encyclopædia. There is a very interesting exposition of the part played by surface active agents in the dyeing of textiles, but no mention is made of the photographic applications of dye complexes formed by the interaction of basic dyes and surface active agents containing an acidic group, or of acidic dyes with surface active agents containing a basic group.

The final section is concerned with the chemical constitution of the surface active agents, and the methods of preparation of the various substances are included. The references are given at the foot of each page instead of collectively at the end of the section and this is probably the best method of arrangement for this type of subject.—J.R.M.

UEBER NEUTRALE UN SAURE SALZE NIEDRIGMOLEKULARER KIESELSAEUREN UND IHRE KONDENSATIONSPRODUKTE. By E. Thilo, H. Funk and E. M. Wichmann. Akademie-Verlag, Berlin. 1951. Pp. 60. Dm. 7.20.

This treatise, presented to the German Academy of Sciences, Berlin, is an approach to the structural chemistry of silicates. The authors attempt to prove with preparatory chemical methods and with systematic synthesis and degradation reactions the constitution of certain calcium- and calcium-sodium-silicates. They thereby presume, that in the silicates the fundamental unit is the orthosilicate ion, in which the silicon is tetrahedrally surrounded by four oxygens, as elucidated by the use of X-ray methods notably developed by W. L. Bragg, Debye, Pauling, and others. Starting from calcium-disodium monosilicate, the authors obtained by means of hydrolysis the hydro- and dihydro-monosilicate, and synthesised wollastonite, xonothlith, pectolith and similar silicates. The experimental work is divided into a general part, dealing with the chemistry of these silicates, and a special part concerning the performance of work, the reactions and final preparations. A discussion of the results, covered with formulae, 20 tables and a very comprehensive bibliography complete the rich contents of the book which will be of special interest both to chemists and mineralogists.—F.N.

Water Pollution Research

Board Issues Report for 1950

THE Report of the Water Pollution Research Board for 1950, just issued (HMSO, 1s. 6d.), contains accounts of improvements in the biological filtration of sewage and industrial waste waters, and of research on the toxicity of various effluent substances to fish. A survey of the Thames estuary to determine the causes leading to the decomposition of silt in the central reaches and to form a theory to account for the dispersion under tidal action of substances discharged into the estuary is also described.

The investigation on toxicity of effluents to fish was a continuation of work done to develop methods whereby the toxicity of a liquid, and particularly of an industrial waste water, can be determined with a known degree of accuracy. In the first place a study is being made of potassium cyanide, and of factors such as temperature, *p*H and the concentration of dissolved oxygen which affect it.

Accuracy Difficulty

A difficulty encountered in this sort of work, says the report, is to develop a chemical method of estimating the concentration of poison accurately enough. The lowest concentration detectable with the phenolphthalein method is 0.25 p.p.m. with an error of 3 per cent. However, with the aid of a Spekker photoelectric absorptiometer as little as 0.05 p.p.m. of $-CN$ can be detected, although when as low as this the estimation is affected by slight differences in technique. Rainbow trout were chosen for experiment, and it was found that equilibrium was lost after between 5 and 64 minutes at a concentration of cyanide of 0.15 p.p.m., the difference in time being to some extent due to difference in size of the fish. Resistance to poisoning increased with successive tests, levelling out to a constant resistance, but this was found to be due to the fish having been in water at a constant temperature during the tests. Experiments will, says the report, be made in the future on the survival of fish in flowing water, partially de-aerated, to which direct poisons may be added.

A complete mixture of waste waters from a paper mill using mainly rag and hemp as raw materials, was successfully treated in a percolating filter during pilot plant experiments. Neutralisation of the strongly alkaline 'black liquor' was unnecessary when it was mixed with other waste waters, the dilution and buffering effect giving a mixture of suitable *p*H value for treatment in the percolating filter. During these experiments the liquid was dechlorinated before filtration but in later experiments it was found that small-scale filters could tolerate up to 12 parts of combined residual chlorine per million.

Sampling of the deposits on the bottom of the River Thames have led to the conclusion that there is a fairly regular gradation in the constitution of deposits throughout the length of the estuary. From 5 to 15 miles downstream of London Bridge deposits have a high organic carbon, Kjeldahl nitrogen, sulphide and moisture content, while those from 20 to 25 miles below it contain much fine material and aluminosilicates, and low proportions of silica and sulphide. In the centre of the estuary where most dredging is necessary, nitrogen and sulphide increase generally with an increase of fine material, although organic carbon is always high in content whatever the particle size. More samples will be collected in the future to study the composition of deposits which may have been eroded from the bed of the estuary or of the sea and carried into the reaches by tidal streams.

Avonmouth Oil Fire Report

REGULATIONS requiring oil companies to replace war-time fixed foam apparatus on storage tanks are suggested by the chief fire officer of Bristol, Mr. J. Y. Kirkup, in his report on the oil fire at Avonmouth last month.

It is contended in the report that the fire could have been more quickly extinguished and the resulting damage considerably reduced if the tanks had been fitted with foam-pourers. All storage tanks at Avonmouth were thus equipped during the war, but they have since been removed.

A suggestion put forward by Mr. Kirkup is that investigation might be made by the Department of Scientific and Industrial Research to produce a foam compound which is impervious to age. The stocks of foam at Bristol were eight or nine years old, and sludge seriously hampered production of good foam by choking the apparatus.

Publications & Announcements

THE Quasi-Arc Co., Ltd., Bilston, Staffordshire, have produced a complete catalogue listing and illustrating the entire range of electrodes, plant and accessories which they manufacture for automatic and manual arc welding. In addition to the products described, this catalogue includes notes on the choice of the correct electrode for particular types of work and the choice of the correct arc welding plant. Descriptions are given of the company's range of electrodes for welding mild steels including those for deep penetration, and specially developed electrodes for carbon steel pipes and molybdenum bearing pipes and for pressure vessels. The range of high tensile steels is also described, including the new low hydrogen 35 electrode having a minimum ultimate tensile strength of 35 tons/sq. in. in the deposited weld metal.

* * *

'AROMATIC Solvents for Paints' is the subject of the latest technical service leaflet (No. 3) now available from Petrochemicals, Ltd. The 15-9/C, K and S aromatic solvents marketed by the company are colourless, of good odour, high flash point, low sulphur content and free from 'tail'. Interesting originally as alternatives to xylols, the 15-9 solvents have established themselves as excellent for use in surface coating formulations based on either oleoresinous or synthetic resin media. Of higher boiling range but noted for its ability to improve flow and brushability is aromatic solvent 23-6, a highly aromatic, straw coloured liquid, possessing a high flash point and high cutting power.

* * *

A NEW standard (B.S. 1763: 1951) applicable to flexible polivinyl chloride film and sheeting (unsupported) in two forms, general purpose, printed and unprinted has just been published by the British Standards Institution (3s. post paid). The standard covers material of nominal thickness in the range 0.004 to 0.015 in. It contains detailed specifications of the mechanical properties of the sheeting together with details of its colour stability, as well as specifying the mechanical details and colour stability of the print. Appendices cover the methods of test.

PREPARATION of Tarmacadam is the subject of its latest illustrated booklet now available from the British Road Tar Association. Also issued is a leaflet setting out the services of the association which include co-operative research advice and assistance in solving technical problems, and production of a series of technical publications.

* * *

THE latest issue of 'Vacuum', published by W. Edwards & Co.—has recently made its appearance. First published in January of this year, the journal plans to come out quarterly, reporting on advances in high vacuum technology and the many important developments in almost every field of industrial and scientific effort facilitated by these advances. It is designed to fulfil a need in the scientific literature by reporting only on vacuum matters, and is addressed to the scientist and industrialist using vacuum procedures or requiring to know about them. The present issue contains articles on multiple-beam interferometry, ultimate pressures of diffusion pumps, and a list of classified abstracts on vacuum research, apparatus and instruments.

* * *

A NEW protective material, 'Glocrete Facing,' produced by Corrosion Limited, is claimed to be a waterproof, acid- and alkali-proof protective covering for a large range of materials, including concrete, cement, masonry, bricks, plaster, stone, timber or asbestos and most types of paint. It is supplied in the form of a water-clear fluid and can be brushed, sprayed or rolled on, and, while being absolutely impervious to water, rain and sea-water, is permeable to water vapour, and therefore allows the structure to 'breathe,' thus minimising the development of dry rot, fungoid growth, etc. Wet surfaces may be coated with 'Glocrete,' say the makers, and being a resinous material, it is very resistant, strong, and flexible. Chemically it resists the action of all acids and alkalis—even concentrated ones—oils, fats, kerosene, etc., dissolving only in a few organic solvents. It resists temperatures up to 80°C., when it starts to soften. Durability is said to be excellent, and the product is expected to find many applications as a protective surface coating in various types of building.

INGENUITY rather than experience is sometimes called for when trying to overcome formidable tasks and save heavy costs. How John Laing & Son, Ltd., solved the problem of moving four large storage tanks at Coryton, is described in the current issue of the 'PD Review' (No. 88), published by Powell Duffryn, Ltd. Canals were cut to a depth of three feet, and the tanks (76 ft. in diameter, 26 ft. high and weighing 100 tons when empty) were towed to their new positions, when the canals were drained off.

* * *

JUST published is the bulletin of the British Whiting Research Laboratories, published by the Research Council of the British Whiting Federation. This issue is No. 9, and contains an article on packaging, a book review, and abstracts from recent literature to do with quarrying and other operations in the whiting industry. This last section occupies most of the bulletin.

* * *

THE British Bulletin of Spectroscopy, a new publication published by Unicam Instruments (Cambridge), Ltd., has just been issued. In addition to its function as an intelligence bulletin for spectroscopists, this tentatively aims to co-ordinate the activities of several spectroscopic groups in Great Britain. It will appear quarterly, at 5s. per annum. The current edition contains sections on emission and molecular spectroscopy, with mention of forthcoming events and reports of meetings. A foreword by S. D. Steel, of the Glasgow Spectrographic Group, makes clear that if successful in its aims the bulletin may furnish a very useful organ for the exchange of ideas among spectroscopists.

* * *

THE range of pumps specially made for handling corrosive liquids by the Kestner Evaporator & Engineering Co., Ltd., has recently been incorporated in a new leaflet issued by the company. These pumps are made to withstand almost any type of corrosive fluid in several different constructional materials. Also included in the pamphlet is a set of capacity tables for a standard range of pumps, covering duties from 5 gallons to 600 gallons per minute, and heads from 10 to 80 feet. The company feel that by publishing these capacity tables it will greatly help chemical engineers in selecting suitable pumps when they are planning new chemical processes. Also published for the first time, is a chart which enables frictional resistance in pipelines to be calculated for a wide range of quantities and pipe sizes. The chart has been compiled on Thomas Box's formula.

* * *

A NEW issue of 'Towers Laboratory News' (No. 6 of a new series) has just been issued by the firm. It contains a selection of instruments from their automatic direct-reading one-pan balance to a manipulator box, all of them developed comparatively recently. Also listed are a few laboratory accessories such as burette holders, hydrometers, support frames and other pieces of equipment. The back page is classed as a diversion, and contains several fine specimens of *bon mot*.

* * *

TOWNSON & Mercer, Ltd., have recently issued pamphlets on some of their new range of products. Included in them are a newly developed chemically resistant resin for surface finishing. This is a cold polymerising liquid phenol-formaldehyde resin that is fume- and heat-proof, can be brush or spray applied, and is supplied with a ready-to-mix catalyst. Also new is a miniature self-priming immersion pump with the main bearing submerged. A new type of fan for their even oven and a new range of even ovens are also described, together with a micro wet grinder and polythene wash bottle.

* * *

A NUMBER of exhibits will be shown by G. A. Harvey & Co., Greenwich Metal Works, S.E.7, at the Building Exhibition being held at Olympia on 14 November. Among them will be examples of zinc and copper roofing, a display of cable fixing trays, various decorative exhibits in ornamental metalwark, a range of galvanised tanks, cisterns and indirect cylinders, etc.

* * *

ADVERTISING 'Bonderite' coatings—a metal finishing process invented by the Pyrène Company Ltd., of Middlesex—an aircraft towing a large banner flew over London at the opening of the 36th International Motor Exhibition at Earls Court on 17 October. Carrying the message 'Demand Bonderised Cars,' the banner was the largest solid one in the world. 'Bonderite' coatings combat rust and corrosion, and are applied beneath the surface paint finish on many types of plant.

PERSONAL

The following staff changes in its sales division at head office are announced by the British Aluminium Co., Ltd.:—MR. S. M. LAWRENCE has been appointed assistant sales manager, unwrought and special products, in the place of MR. R. M. WARRINGTON, who is relinquishing his position with the company at the end of this month. Mr. Lawrence will be responsible, under the home sales manager, for the sales routine for: powder and paste; unwrought products (slabs, wirebars, virgin and secondary pure and alloy ingots, etc.); and special products (alumina, hydrate and red oxide). MR. O. M. BRUCE PAYNE has taken over responsibility for the technical service section of development department in place of Mr. Lawrence.

The following were among those elected at the recent Llandudno conference to fill the national offices in the Purchasing Officers' Association for 1951/52: *President*: MR. T. L. GARNER, M.Sc., D.L.C., A.R.I.C., A.M.I.Chem.E., A.F.Ae.Soc., F.I.R.I. (Precision Rubbers, Ltd.); *vice-presidents*: J. C. THOMPSON (Edgar Allen & Co., Ltd.), C. H. TOMLINSON (Boots Pure Drug Co., Ltd.); *chairman*: H. W. KING (Eburite Corrugated Containers, Ltd.); *vice-chairman*: F. J. WHITE (Chance Bros., Ltd.); *hon. treasurer*: R. J. MITCHELL (The Morgan Crucible Co., Ltd.).

Employees of Orrs Zinc White Ltd., Widnes, have presented to MR. D. J. W. ORR a two handled Georgian silver cup (made in 1761) to mark his retirement from the chemical industry. The gift was handed to him by Mr. E. Wallis, works manager. Mr. Donald Orr is the son of the late Mr. John Bryson Orr who established the Widnes works of Orr's Zinc White in 1898. He joined the staff of his father's business in 1902 and became managing director in 1913. He was elected a member of the council of the Association of British Chemical Manufacturers in 1934 and held this office till 1947. A founder of British Barytes Producers' Association when formed in 1941, he is still a member of the organisation.

MR. W. R. STOREY, who has been production director of the Salt Division of Imperial Chemical Industries, Ltd., since 1948, has been appointed salt division managing director with effect on and from 1 November. After serving an engineering apprenticeship at Amos & Smith (a subsidiary of Earls Shipbuilding Company), he studied engineering at Downing College, Cambridge, and joined Brunner Mond & Company in 1920 on the engineering staff. He was transferred to the works manager's staff in 1926, and became works manager of Wallercote Works in 1928 and works manager of Winnington Works in 1939. He was transferred to the Salt Division as production director in 1948. Mr. Storey succeeds Mr. A. Miscampbell, who retires on 31 October.

Mr. Alfred Ratcliffe

MR. ALFRED RATCLIFFE, who has been appointed production director in succession to Mr. Storey, joined Buxton Lime Firms. Ltd., in 1929, after graduating at Manchester University with a first class degree in mechanical engineering. He became responsible for works development and design and paid numerous visits to Belgium, France and Italy in order to study quarrying practice there. In 1944 he visited a number of large engineering and quarrying firms in the U.S.A. He joined; the Salt Division as deputy chief engineer in May, 1950.

Obituary

The death in Philadelphia was announced on 8 October of DR. OTTO MEYERHOF, one of the foremost physiological chemists in the world, and winner of the Nobel Prize in Medicine in 1923. He was Professor of Biochemistry at the Pennsylvania University.

HOME

Magnesium Works Reopened

Closed down five years ago, their wartime mission accomplished, Harrington shore works at Workington were reopened on 5 October for the recovery of magnesium salts, used for making magnesium metal, from seawater. The only other similar plant in the country is at West Hartlepool.

Oxford Extends Invitation

An invitation to the British Association for the Advancement of Science to hold its 1954 meeting in Oxford has been made by the University and Oxford City Council. The last local meeting of the association in Oxford was in 1926 when the Duke of Windsor (then Prince of Wales) was president.

Steel Output Lower

Production of steel in the U.K. in September was at an annual rate of 15,749,000 tons. This showed an improvement of 1,894,000 tons over the August figure when output was affected by holidays, but was 1,215,000 tons less than the annual rate achieved in September, 1950. To reach the target of 16,000,000 tons for 1951, the industry will have to produce over 4,250,000 tons in the last three months of the year, equivalent to an annual production of 17,116,000 tons. Pig iron output was higher with an annual rate of 9,854,000 tons, as against 9,409,000 tons in August, and 9,712,000 tons in September last year.

Londex Open Third Factory

After Londex's Anerley factory proved inadequate for the continually increasing demand for their products, they opened two years ago a second factory in Penge. Now this is also fully extended and Londex have therefore acquired a third factory, this time in Croydon. It is expected that this will result in time in a considerable reduction in the delivery time to their customers both at home and abroad.

The main offices and research section remain at the Anerley Works: telephone SYDenham 6258, and the Progress (Delivery Inquiries) and Buying Departments at the Penge Works; telephone SYDenham 2431.

Change of Address

The address of William Palfrey, Limited, and William Palfrey (Jute) Limited has been changed to Palfrey House, 24 City Road, London, E.C.1. The telephone number is Monarch 0681, and the telegraphic address Palfsack, Ave., London.

Department Moves

The Chemical Industry Management Department of The Shell Petroleum Co., Ltd., is now accommodated in St. Swithin's House, St. Swithin's Lane, London, E.C.4. The new telephone number is Avenue 7144. Correspondence should still be addressed to St. Helen's Court London, E.C.3.

New Board Member

The chairman of The General Chemical and Pharmaceutical Company, Limited, Mr. R. S. Haskew, has announced that his elder son, Major R. J. A. Haskew, B.Com., A.C.I.S., has been elected to a seat on the Board of the company.

Margarine Works Manager Retires

With the retirement, for reasons of health, of Mr. Eric Watson, general works manager of Stork Margarine Works, Bromborough, the margarine industry has lost one of its most outstanding personalities.

Mr. Watson was born in the Argentine, but was educated in this country. He started his business career in 1913 as a chemist in the laboratories at Port Sunlight, and saw service in the 1914 war. He became works manager of Lever Bros.' hardening plant, and in 1935 was appointed general works manager of Stork Margarine Works, a position which he held for the following 16 years. Although he has given up the managership of the works, Mr. Watson retains his seat on the board of Messrs. Van den Berghs and Jurgens Ltd.

Following upon his retirement, Mr. J. D. Buxton, B.A. (Camb.), A.R.I.C., M.I.Chem.E., has been appointed general works manager at Bromborough. Mr. Buxton was formerly assistant general works manager. The latter post has been filled by Dr. W. N. Stokes, Ph.D. (Lond.), F.R.I.C., F.R.S.E.

Next Week's Events

MONDAY 22 OCTOBER

Industrial Diamond Information Bureau

London: South East London Technical College, Lewisham Way, S.E.4, 7 p.m. P. Grodzinski: 'Shaped Diamond Tools'.

Fine Chemicals Group (SCI)

London: Royal Institution, 21 Albemarle Street, W.1, 7 p.m. Professor A. R. Todd: 'Vitamin B_{12}'.

2nd Fertilizer World Conference

Zurich: 24 Beethovenstrasse, 22-25 October.

The Chemical Society

Oxford: Physical Chemistry Laboratory, South Parks Road, 8.15 p.m. Dr. G. Gee: 'Some Equilibria and Reactions of Sulphur'.

The Textile Institute

London: Chemical Society, Burlington House, W.1. K. W. L. Kenchington: 'Science of Clothing in Relationship to Comfort and Human Efficiency in Cold Conditions'.

TUESDAY 23 OCTOBER

Royal Institute of Chemistry

Leeds: The University, 6 p.m. J. G. A. Griffiths: 'Rockets and Chemistry'.

Electrodepositors' Technical Society

Coventry: East Midlands Electricity Board, Sandy Lane. E. C. J. Marsh: 'Finishes for Communications Equipment with Special Reference to Electroplate Coatings'.

Chemical Engineering Group (SCI)

London: Geological Society, Burlington House, W.1, 5.30 p.m. G. M. Rowell: 'Some Sulphur Recovery Processes in Refining Operations'.

The Textile Institute

Leeds: The University, 7.15 p.m. J. R. Healey: 'Industry and the Student'.

WEDNESDAY 24 OCTOBER

Manchester Metallurgical Society

Manchester: Engineers' Club, Albert Square, 6.30 p.m. H. O. Smerd: 'Recent Developments in Electrically Welded Chains'.

Food Group (SCI)

London: Burlington House, W.1, 6.15 p.m. Dr. R. P. Cox: 'The Physiology and Psychology of Alcohol'.

Manchester Literary and Philosophical Society

Manchester: Portico Library, Mosley Street, 5.45 p.m. 'Efficiency Methods in the Chemical Society'.

THURSDAY 25 OCTOBER

The Chemical Society

Aberdeen: Chemistry Department, Marischal College, 7.30 p.m. Dr. L. E. Sutton: 'Applications of Electric Dipole Moments to the Determination of Structure'. (Jointly with RIC and SCI).

Hull: Science Lecture Theatre, University College, 6 p.m. R. P. Bell: 'Some Methods of Measuring Reaction Velocities in Solution'.

Liverpool: Chemistry Lecture Theatre, The University, 4.30 p.m. Professor Wilson Baker: 'Some Recent Work on Large Ring Compounds'. (With RIC, SCI and BAC).

Royal Institute of Chemistry

London: Waldorf Hotel, Aldwych, W.C.2. Discussion on the Application of Statistical Methods to Chemistry.

Incorporated Plant Engineers

Sheffield: Grand Hotel, 7.30 p.m. F. Hinsley: 'Steelmaking from the Plant Engineer's Viewpoint'.

FRIDAY 26 OCTOBER

Electrodepositors' Technical Society

Sheffield: Grand Hotel. H. Silman: 'Alternative Finishes to Nickel and Chromium Plate'.

Society of Public Analysts

London: Medical Society of London, Chandos Street, Cavendish Square, W.1, 2.30 p.m. Symposium: 'The Evaluation of Chemotherapeutic Substances'. Also Saturday, 27 October, 10 a.m.

OCCA (Manchester Section)

Manchester: Grand Hotel, 6.45 p.m. Dinner Dance.

The Chemical Society

Birmingham: Chemistry Lecture Theatre, The University, Edgbaston, 4.30 p.m. Dr. U. R. Evans: 'Some Aspects of Oxidation and Corrosion'.

Glasgow: Chemistry Department, The University, 3.30 p.m. Dr. J. Taylor: 'Chemicals as a Source of Energy, with Special Reference to Industrial Applications and to Jet Propulsion'.

Newcastle: Chemistry Building, King's College, 5.30 p.m. Professor A. C. Chibnall: 'Recent Advances in the Chemistry of Insulin'.

Swansea: Chemistry Department, University College, 5.30 p.m. D. C. Henry: 'Electrochemical Aspects of Colloid Science'.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

DEB CHEMICAL PROPRIETARIES, LTD. (formerly DEB SILKWEAR PROTECTION, LTD.), Belper. (M., 20/10/51). 27 August, charge, to Westminster Bank, Ltd., securing all moneys due or to become due to the bank; charged on land and factory known as Forfar Works, Spencer Road, Belper, and fixtures. *Nil. 1 December, 1950.

GEORGE ROYSTON & SON, LTD., Barnsley, chemical engineers, etc. (M., 20/10/51). 30 August, debentures, to Barclay's Bank, Ltd., securing all moneys due or to become due to the bank; general charge. *£4,000. 31 December, 1949.

Satisfaction

GEORGE ROYSTON & SON, LTD., Barnsley, chemical engineers, etc. (M.S., 20/10/51). Satisfactions, 30 August, of mortgages or charges registered 25 June, 26 August, 8 September and 9 December, 1947, and of debenture registered 1 June, 1948.

New Registrations

Greeff-Chemicals Holdings, Ltd.

The directors of Greeff-Chemicals Holdings, Ltd., have declared an interim dividend on the ordinary shares of 4½ per cent actual less tax (4 per cent), on account of year ended 31 December, 1951. The dividend is payable on 1 November to shareholders on the register 9 October.

Increases of Capital

The following increases of capital have been announced:—EAGLESCLIFFE CHEMICAL CO., LTD., from £300,000 to £350,000; JEYES SANITARY COMPOUNDS CO., LTD., from £100,000 to £150,000; UNITED SULPHURIC ACID CORPN., from £100 to £1,200,000; CROWN CHEMICAL CO., LTD., from £7,000 to £12,000; ALLIED COLLOIDS (MFG.) CO., LTD., from £5,500 to £1,500; ANGLO-SCOTTISH CHEMICAL CO., LTD., from £6,000 to £50,000; HULL CHEMICAL WORKS, LTD., from £15,000 to £20,000.

Company News

Glaxo Laboratories, Ltd.

Subject to completion of audit, Glaxo Laboratories, Ltd., announce the profits of the group for the year ended 30 June, 1951, amounted to £1,365,000 (£1,237,000) after providing for all charges including £1,736,000 (£1,162,000) for U.K. taxation. It is proposed to place £250,000 to obsolescence and replacement reserve, and £150,000 for future research and development. A second interim dividend of 7½ per cent is declared payable on 12 December, 1951. If the present proposals of Government for the limitation of dividends are confirmed, the distribution for the year will then be the maximum permitted and no final dividend will be recommended. Otherwise a final dividend of 7½ per cent also payable on 12 December, will be recommended for confirmation by the stockholders at the annual general meeting to be held at the Charing Cross Hotel, on 11 December.

British Celanese, Ltd.

Problems raised by shortages—particularly sulphuric acid and cotton linters—and the increased prices of raw materials are referred to in the statement of the chairman, Mr. G. H. Whigham, in his survey of the year ended 30 June, 1951, to be presented at the 32nd annual general meeting of British Celanese, Ltd., to be held at Winchester House, Old Broad Street, London, on 25 October. In order to safeguard future supplies of sulphuric acid, the company took an interest (commensurate with its usage) in the newly formed United Sulphuric Acid Corporation, Ltd. It will, however, be some three years before supplies from this source are available. Further expenditure has been approved on plant expansion and modernisation and the importance of continued research and development is emphasised. Net profit after taxation amounted to £3,113,646. A final dividend of 3 per cent (less tax) on ordinary stock is recommended. A resolution will be put at the meeting that the capital of the company be increased from £10,450,000 to £13,750,000 with 6,600,000 new ordinary 10s. shares.

Market Reports

LONDON.—There has been a fair weight of new business in the home market for industrial chemicals and contract delivery specifications have been fully up to schedule. Buying for shipment is not less in volume than during recent weeks, and offers for prompt delivery have no difficulty in finding an outlet. Prices are firm throughout and generally unchanged. The demand for potash and soda compounds remains brisk with yellow prussiate of soda a 1d. a lb. dearer. Elsewhere the lead oxides are moving well and active demand persists for most of the non-ferrous metal compounds. Steady conditions prevail in the coal tar products market and a good demand persists for all grades of cresylic acid.

MANCHESTER.—Prices are well held in all sections of the Manchester chemical market and steady trading conditions have been reported during the past week. There have been plenty of offers of new business for home users, but in the case of many lines manufacturers are well booked for forward delivery. Existing contracts in the alkalis, potash and ammonia compounds are being drawn against steadily, and this is also reported with regard to a wide range of other heavy chemicals, including alum and the magnesia chemicals. Persistent pressure for supplies of the light and heavy tar products is also reported.

GLASGOW.—The general position remains more or less unchanged with a steady demand for most chemical products. Buyers are holding off to some extent until prices have stabilised. This is due to the latest increase in the price of sulphuric. With regard to export, the position remains very healthy.

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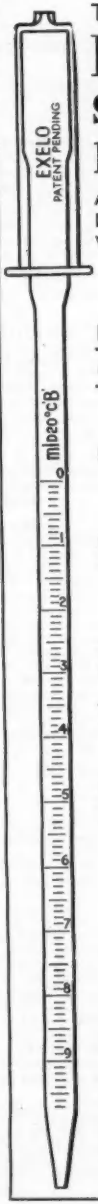

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AMENDED

SENIOR SCIENTIFIC OFFICERS ; SCIENTIFIC OFFICERS. The Civil Service Commissioners invite applications for permanent appointments to be filled by competitive interview during 1951. Interviews began in January and will continue throughout the year, but a closing date for the receipt of applications earlier than December, 1951, may eventually be announced. Successful candidates may be appointed immediately. The posts are in various Government departments and cover a wide range of scientific research and development in most of the major fields of fundamental and applied science. Candidates must have obtained a university degree with first or second class honours in a scientific subject (including engineering) or in mathematics, or an equivalent qualification, or possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience. Candidates for Scientific Officer posts taking their degrees in 1951 may be admitted to compete before the result of their degree examination is known.

Age limits : For Senior Scientific Officers, at least 26 and under 31 on 1st August, 1951 ; for Scientific Officers, at least 21 and under 28 (or under 31 for permanent members of the Experimental Officer class) on 1st August, 1951. London Salary Scales : Senior Scientific Officers (men), £750–£950 ; (women) £625–£850. Scientific Officers (men), £400–£650 ; (women), £400–£525. Somewhat lower rates in provinces.

Further particulars from : **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, TRINIDAD HOUSE, OLD BURLINGTON STREET, LONDON, W.1,** quoting No. 3399.
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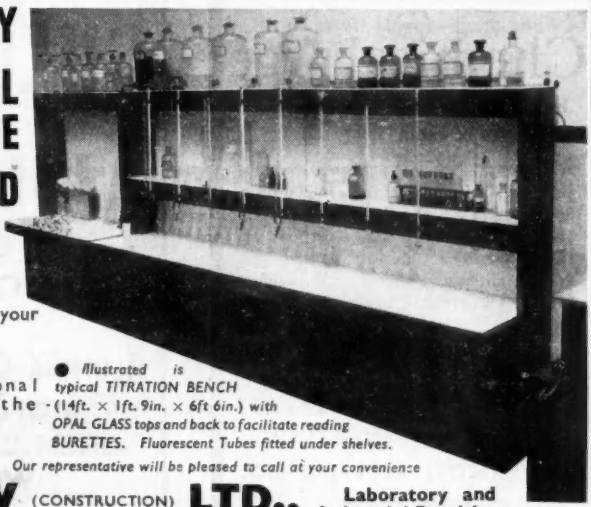

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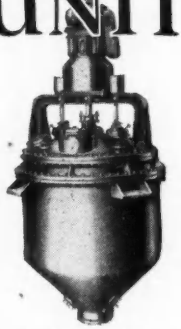

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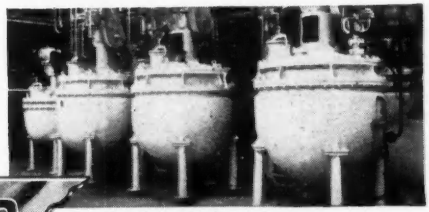

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